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The "M.E." Exhibition Championship Cup Models.

PERSONAL NOTES BY THE WINNERS.

1.—Mr. J. S. Mendez and his Model Siege Gun.

AT the request of the Editor, I am writing the following short description of the 1 in. scale model of a 12 in. siege gun which enabled me to win that much coveted prize, a MODEL ENGINEER Cup. Before doing so, however, a brief account of my experiences as a model engineer may be of interest to readers.

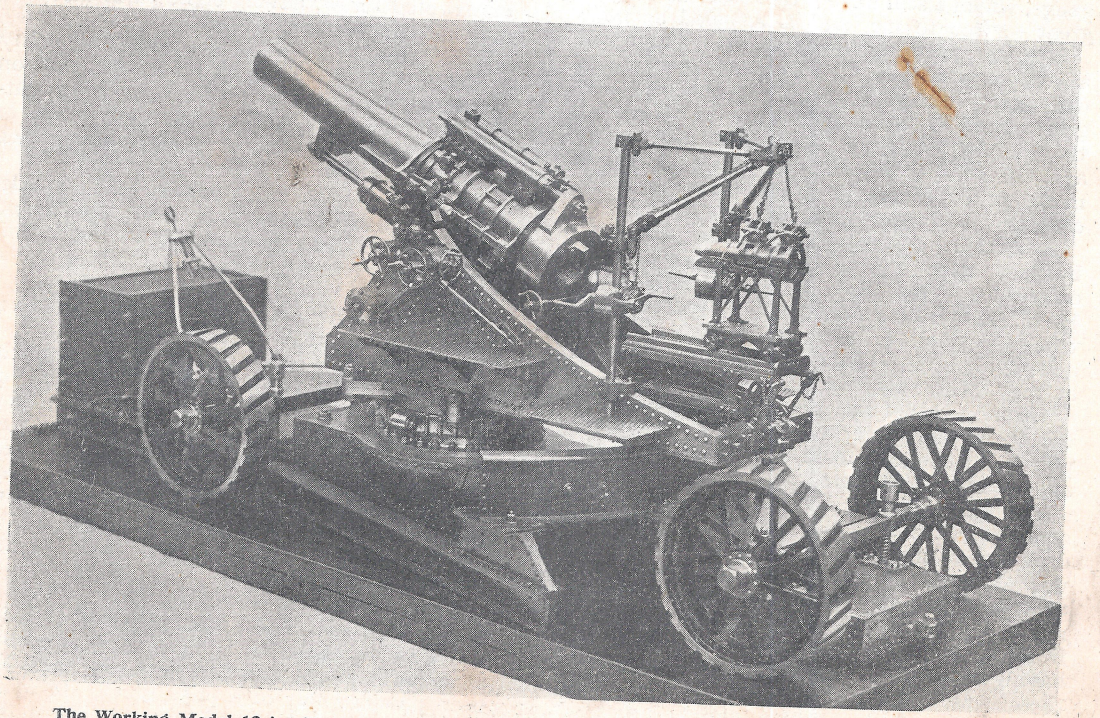
The urge to make a model first took possession of me when a boy going to school.

I visited an exhibition in Dublin in which was exhibited a model locomotive. This model fired my ambition to make one like it, but I had no opportunity to make the attempt till some time after joining the Royal Marines. I had been in the Royal Marines about four years, spending two of these years at sea.

Mr. J. S. Mendez (of Portsmouth).

On my return to the Royal Marine Barracks at Forton I decided to make a start, so, buying a pair of cylinders, some material, and a few tools, I commenced my model making activities, with hopes, which were doomed, however, to failure for many years. On going to sea again, I was compelled to leave my model making gear in store in barracks. I was away on foreign service just over five years; on my return I found all my tools and gear had vanished from the store. I soon bought some more tools and materials, and made another start. This time I decided to attempt the casting and making of the cylinders myself. Having read the life of Leonardo Da Vinci, I thought it would be a very good plan to follow his method of casting from wax patterns. Buying some wax candles I melted them down into two square blocks, and carved them into the shape of cylinders. These wax patterns were then placed in a box and plaster of paris poured round them. When the plaster was set and the mould removed from the box, a hole was cut through the plaster. The mould was then placed in the oven till the wax was melted and then emptied. My first attempt, however, ended in failure.

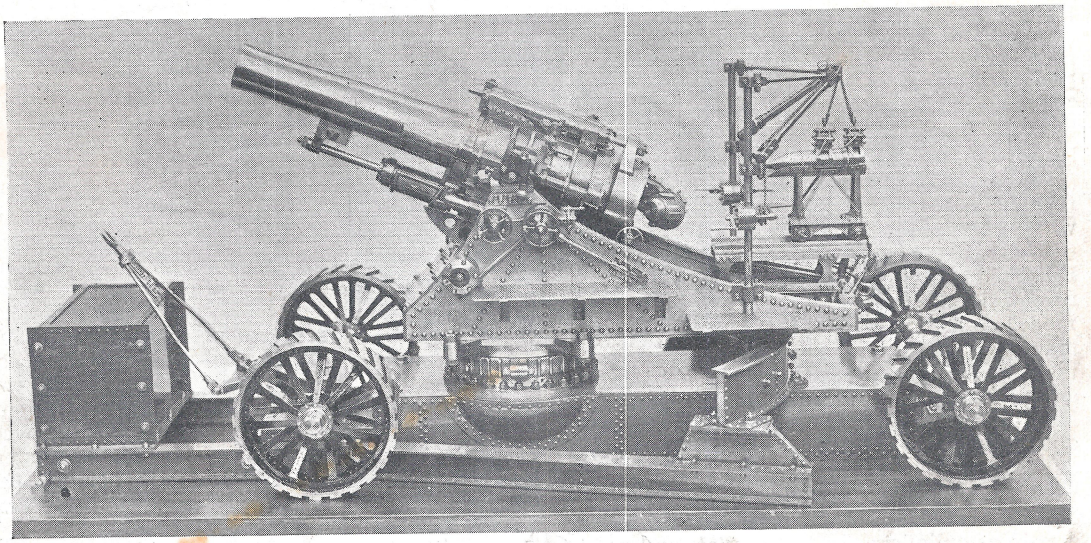
With the assistance of the Regimental blacksmith, a quantity of brass was melted in a plumbago crucible in the forge fire, but on pouring the molten brass into the mould, a loud explosion took place, with the result that



The Working Model 12 in. Siege Gun, awarded the Championship Cup in the General Engineering Section.

the mould and its contents were scattered in all directions, fortunately, however, without serious results to anything but the mould. This result we attributed to the mould not being dry enough.

The next mould was left in the cook-house oven about 24 hours with very satisfactory results. The castings turned out very clean and free from blow holes. The model loco. when finished some years later was photographed and a copy sent to the "M.E." with



Full side View of the 1 in. scale Model Siege Gun.

a short description. The Editor was good enough to publish it, and sent me a "Columbus" gauge, which I still have; this tool has been of great service to me, and is as good as new.

My next serious attempt was the making of a ¾ in. scale model of a 6 in. naval gun, and a demonstration model of the Walschaerts valve gear. Both these models were exhibited at the "Model Engineer" Exhibition some years ago, the ¾ in. scale 6 in. gun winning a bronze medal and diploma of merit, and the Walschaerts valve gear a diploma and £1.

As a result of this success, I felt considerably bucked, and started on something more ambitious. This was a ¾ in. scale model of a 12 in. Howitzer mounted on a railway well truck; it took 6 years to make, and was awarded a bronze medal and diploma of merit at the "M.E." Exhibition.

My next model was the 1 in. scale model of the 12 in. siege gun, mounted for road transport. This model took four years to make, and won me the coveted cup.

The first difficulty I came up against when commencing this model was the fact that no drawings of any kind were available; but I was fortunate in being able to borrow some very good photographs of the gun I wished to make a model of. These photos had been taken from several different points of view, and having questioned several men who served on these guns, I obtained a number of very useful dimensions, which enabled me to construct scales of considerable accuracy. As all these photos were not taken from the same distance, each photo required a separate scale to get good results.

The first part of this model taken in hand was the outer jacket. This is a steel casting from my own pattern. The casting was first chipped all over with a cold chisel and rough turned to slightly over finished dimensions. It was then bored through to take the A tube. The chamber and recess for the breech nut were then bored, the latter being screw-cut for the reception of the breech nut. This nut is threaded on the outside to screw into the breech of the gun, and on the inside with an interrupted screw, having eight parts threaded and four parts plain.

The turning of this jacket presented many difficulties, as there are two solid fins cast on it, which prevented the turning being a straightforward job. The A tube was next taken in hand and rifled with thirty grooves, after which it was forced into the jacket.

Being unable to obtain a casting for the cradle, it had to be made from sheet metal, the rib and flanges being riveted on and silver soldered. This I think made a stronger job than a casting would have done.

The hydraulic and air cylinders for overcoming the recoil are attached to this.

The carriage is built up of ⅛" steel plate, the angles and other parts being either riveted or bolted together as necessary. The carriage carries the loading trollies, these being worked by compressed air, the cylinder being of steel and provided with a ram having three cup leather washers on its head, and the necessary valves and pipes for working the same. The carriage also carries the two derricks for hoisting ammunition.

The pedestal on which the gun revolves is turned from two solid steel disks ¾ in. thick and 6 in. in diameter. These I found thrown away on a refuse dump; they had evidently been punched out of a steel plate. It was a heavy job cutting out the centre with a thin

parting tool and turning the outside to dimensions.

The clip ring was made from 1 in. mild steel bar, filed and turned to shape. This ring holds the upper and lower roller race together; between them is the live roller ring, on which is mounted twenty conical steel rollers on steel, pins secured to the ring with nuts.

The clip ring is in two parts, kept together by bolts and nuts.

The travelling carriage is made of sheet steel cut to shape and riveted to angle irons, it supports the axles on which are the road wheels, and the pedestal which is bolted to it with thirty bolts and nuts. The wheels are similar to traction engine wheels and have twenty spokes; they are built entirely from strip and sheet steel.

Passing through the axles are the lifting screws. These are of steel with square threads and capstan heads. They are intended to lift the carriage from the ground when the gun is in the travelling position; the large box in front is filled with gravel or sand before the gun is fired, in order to prevent the mounting jumping. and also to keep the gun steady.

When travelling, the side girders and box are removed and stowed on the carriage. These girders are attached to brackets on the carriage. The breech block is mounted on a carrier attached to the lugs on the right of the breech, and is worked by a wheel on the left.

The sight is a copy of a prismatic sight, and has all the working movements of the original, but is without lenses or prisms.

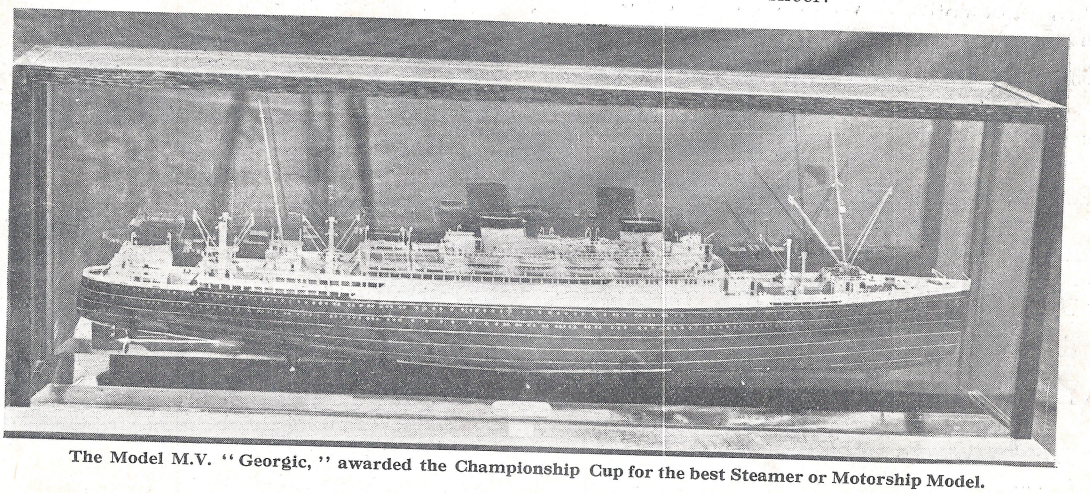
2.—Mr. C. Collins and his model of the M.V. "Georgic."

IT may interest many readers how I turned towards model making. As a boy, I had always been fond of ships, both steam and sail, paying many visits to the pier head at Barry Docks to see the ships of many nations arrive into port. A little later I found myself in one of the dockyards with a job as a rivet hander, working on some of the finest sailing ships afloat. A few years later, still at the docks, I served an apprenticeship to a blacksmith.

The Great War took me away for five years, after which I found my way back again amongst the ships. Little or no sail was noticeable, and the steamers were much larger.

Not having very much work these past few years, and having plenty of time on hand, it dawned on me to make a model. On the way to the docks one day, I met a friend, and told him what I intended doing to pass the time away. He let me have some shipping journals; from these I selected "The Motorship," which had plans of the liner M.V. *Georgic*. To this journal I feel very much indebted, and also to the Cunard-White Star Company for their kindness in helping me along. Not having the necessary means to purchase a first-class piece of pine to form the hull, the only alternative I could think of was to frame and plate a hull, which I found a very difficult task. After much time and patience I pulled through. Each of the plates was fixed in position on the framing in a manner forming inner and outer strakes, with the plate butts running diagonally across the hull, also, at the same time, working in the sheer.

Mr. C. Collins (of Barry.)



The Model M.V. "Georgic," awarded the Championship Cup for the best Steamer or Motorship Model.

After the hull had been completed, including the plating of the propeller brackets, I counted some 750 plates. These plates were cut from old pear tins of one brand, to keep the same gauge. The same number of rows from under the bow to main deck, also from over the rudder to M deck were as in the prototype. The two three-bladed propellers came next. These were brass, the shafting being motor wheel spokes.

The inside of the hull being nicely painted, I proceeded by fitting the decks, also deck supports, not forgetting the deck housing. Here I kept strictly to scale, having seen models with superstructure too lofty, leaving the hull an easy jump in case somebody wanted to tumble overboard.

The decks being fitted, including fiddle top and handrail, I started to make 40 Wellin type davits. These were made from thick copper wire, the only material I could lay my hands on. These were secured to the decking by means of two pin points soldered at the base of each, clinching underneath through the metal holding the deck planks, making a sturdy job.

Next came thirty lifeboats, which were made from yellow pine. The insides were deep-colour satin walnut. There were eighty blocks for the boats, also two propellers made from pin heads for the motor boats. The fan vents of many shapes were made chiefly of thin brass sheet and painted with several very thin coats of enamel. It may interest readers to know that the ladders leading up the six samson posts were only 1/16 in. wide, the longer ladders having 34 rungs. The 16 Scott type winches were made from boxwood, which formed the castings. The numerous winch barrels were made from brass, the holes to take the shafting were made with drills from needles. I may state here that all the winch barrels were hand filed and not turned in a lathe; the same applies to anything that is round on the model. So you see I am not a great lover of machine made model liners, etc.

The sixteen deck step ladders were made from our friend the pear tin, each having eleven separate strips, which could be placed under a small thimble. The rounded bridge house is also built of separate plates. The funnels and bridge are the same dear old pear tin metal. The masts are of steel, something to heave away on when one is fixing the rigging. The derricks and samson posts are complete with goosenecks and G neck bracket, also eye bands. The hand-railing is made from midget brass pins and very fine bead wire; the five bars are only 1/32 in. apart, and soldered, a most difficult job indeed. The pin heads were flattened to the shape of a palm foot and soldered against the top edge of the hull. None of the handrail stanchions pierced the decks. Lastly, the satin walnut which forms the decks was given to me for a small packet of cigarettes. The building, polishing, painting and seeking information had taken me close on two years. The only real outlay was a few shillings for petrol for a blowlamp which was given to me to repair.

The "Model Engineer" Exhibition.

The Principal Awards for Competition Work.

OFFICIAL PRIZES.

Championship Cup for General Work.

No. 22—Working Model of 12 in. Siege Gun. J. Mendez (Portsmouth).

Championship Cup for Locomotive Models.

No. 76—$\frac{3}{4}$ in. Scale Model "Royal Scot" Type Locomotive. W. T. W. Rolls (Nottingham).

Championship Cup for Sailing Ship Models.

No. 188—Scale Model of four-masted Barque, *circa* 1880. C. H. Lines (Southampton).

Championship Cup for Steamship Models.

No. 214—Scale Model of Cunard-White Star Motor Vessel "Georgic." C. Collins (Barry).

Model Railway Prizes.

No. 53—Scale Model of Midland Railway (L.M.S.) 0-4-4T Locomotive, Electrically Driven. K. I. Dexter (St. John's Wood). £2 and Very Highly Commended.

No. 46—L.M.S. (Caledonian Section) 0-4-4T Locomotive, "00" Gauge. C. B. Baird (Paisley). £1 and Very Highly Commended.

No. 63—"HO" Gauge S.R. 0-4-4 Drummond Tank Locomotive, Electrically Driven. G. J. Jefferson (Woking). 10s. and Highly Commended.

Model Aeroplane Prize.

No. 115—Scale Model De Havilland "Dragon Rapide" Aeroplane. S. F. Banks (Hayes End). £2 2s. and Bronze Medal.

Bought Castings Prize.

No. 13—15c.c. Four-Stroke O.H.V. Petrol Engine, with Carburettor and Contact Breaker. D. H. Evans (Peckham). £2 2s. and Highly Commended.

Junior Prizes.

No. 255—Scale Model of the "Golden Hind." E. G. Sims (Ashford). £1 and Very Highly Commended.

No. 174—Working Model Hand Loom. Miss M. Ellis (Gt. Missenden). 15s. and Commended.

No. 165 — Flying Scale Model British "Klemm" Eagle Monoplane. A. G. S. Anderson (Nottingham). 10s. and Very Highly Commended.

Silver Medals.

No. 7—Free-Lance Model Road Racing Car Chassis. J. H. E. Chapman (Seven Kings).

No. 23—Free-Lance Working Model Showman's Road Locomotive. Merrington (Haslemere).

No. 37—Working Model Horse-drawn Steam Fire Engine. G. W. Trumble (Wapping).

No. 40 — Free-Lance Model Compound Marine Engine. E. B. Wilcox (Weaverham).

No. 42—Free-Lance Model Twin Cylinder Steeple Engine, as used on River Steamers in the '80's. H. B. Wood (Teddington).

No. 51—Scale Model of "Locomotion 1825" and Tender on Length of Cast Iron Track of the Period. T. A. Common (Regents Park).

No. 150—Scale Model Lancashire Loom. T. Jolly (Manchester).

No. 176—Scale Model Deal Galley of 19th Century. Major M. Castle-Smith (Bridport).

No. 181—Model Steel Built Sailing Ship with all Running Rigging. T. Graham (Middlesbrough).

No. 184—Scale Model of H.M.S. "Victory." A. C. Jackson (Worthing).

No. 215—Working Model of Naval Picket Boat, as carried by H.M.S. "Hood." M. J. H. Cowie (Edinburgh).

No. 228—Scale Working Model Steamship, Representing Cunard "A-A" Class. F. H. Hardy (Brighton).

No. 237—Scale Model of H.M.S. "Iron Duke," as altered after Jutland. G. B. Nicholson (Cheam).

No. 241—Scale Model of Motor Drift and Seine Net Boat "Bounteous Sea." P. A. Rumbelow (Yarmouth).

Bronze Medals.

No. 4—Working Model Steam Lorry with Two-cylinder Engine. R. C. Beck (Stratford-on-Avon).

No. 34—Scale Model Girder Pattern Steel Pit Head Gear, as used at Pinxton Collieries, Derbyshire. W. Surgey and E. Wood (Pinxton).

No. 41—Scale Working Model Beam Engine, with Condenser. G. T. Williams (High Wycombe).

No. 44—Free-Lance Single-Cylinder Four-stroke Petrol Engine, O.H. Valves. C. Yokota (Egham).

No. 179—Scale Model of H.M.S. "Tartar" of 1734. C. Gillard (Streatham).

No. 206—Scale Model of Modern Diesel-Engined Fishing Skiff. A.G.A.

No. 246—Working Model Cabin Cruiser "Ruby Marian." H. L. West (N. Finchley).

SPECIAL PRIZES.

The "Sarawak" Trophy and Very Highly Commended.

No. 87—R. S. E. Hill (Norwich.)

The "Stockholm" Prize.

W. B. Hart.

The "Tyrer" Prize of £5 5s. and Silver Medal.

No. 234—Scale Model of L.N.E.R. Twin Screw Cross-channel R.M.S.S. "Vienna." H. Macklin (Dovercourt).

The "Forster" Prize of £1 1s. and Very Highly Commended.

No. 137—Sensitive Lever Feed High Speed Drilling Machine. W. L. Rowson (Wainfleet).

"Electrical Industries" Prize of £2 2s. and Bronze Medal.

No. 154—Scale Model of Early Ship's Wireless Outfit. W. Rose (Plymouth).

Electric Traction Prize of £3 3s.

Not Awarded.

The "Keen" Prize of £2 2s. and Very Highly Commended.

No. 56—S.R. 4-4-0 Locomotive, "Schools" Class, "Dover," Electrically Driven. L. G. Freeman (New Eltham).

The "Keen" Prize of £1 1s. and Highly Commended.

No. 72—Working Model "Royal Scot" Locomotive, as fitted for Visit to America, Gauge "O." R. G. Oliver (Rugby).

The "Sparkes" Prize of £2 2s. and Very Highly Commended.

No. 162 — Electrically Propelled Model L.S.W.R. 0-4-4T Locomotive, with all External Details. Gauge "0." H. A. R. Turner (Wimbledon).

The "Geary" Prize and Very Highly Commended.

No. 161—Working Model 4-6-2 Type Steam Locomotive, 2½ in. Gauge. D. A. Newland (Streatham).

The "Stuart Turner" Prize of £2 2s. and Highly Commended.

No. 19—Stuart Turner ⅛ h.p. Gas Engine. R. Jaques (Boston).

The "Aubin" Prize of £2 2s. and Very Highly Commended.

No. 152—Small eight-day Two-Train Long Case Chiming and Striking Clock. C. B. Reeve (Hastings).

The Auto-Gyro Prize of £2 and Very Highly Commended.

No. 118—Scale Working Model Auto-Gyro, C.30 type. J. W. Bishop (Rotherhithe). (Subject to Certificate.)

The "Barker" Prize of £1 1s. and Very Highly Commended.

No. 134—Lathe Tool Holder (Swivelling and with Height Adjustment). F. A. Leete (Woking).

The "C.R.S." Encouragement Prize of £1, and Commended.

No. 15—Scale Model Traction Engine (Expansion Type) fitted with Coal Fired Boiler. A. Funnell (Uckfield).

The "Shackle" Prize of £3 3s. (Divided).

No. 313—Photos of Steam Cultivating Machinery. J. Russell (Cranbrook). £1 11s. 6d. and Commended.

No. 314—Photos of Examples of General Agricultural Machinery. R. W. Wood (Leeds). £1 11s. 6d. and Commended.

The "Conybeare" Memorial Prize of £1 1s. and Bronze Medal.

No. 309—Photographs of Examples of Old Millwrighting and Engineering. H. O. Clark (Norwich).

The "Hands" Prize of £1 1s. and Very Highly Commended.

No. 138—Machine for Rapidly Trimming Aluminium Discs, Free-Lance Design. L. G. Shepherd (Banbury).

The "Draper" Prize of £1 1s. and Very Highly Commended.

No. 175—Scale Model 16th Century Warship. R. F. Bush (Ilford).

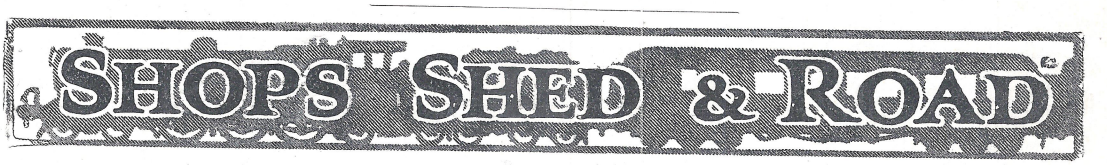
In addition to the above, competitors were awarded 17 Very Highly Commended Diplomas, 36 Highly Commended, and 74 Commended.

DRAWING COMPETITION.

Bronze Medal.

No. 284—Roof of Henry VII Chapel in Westminster Abbey, with Constructional Detail. C. S. Ellis (Gt. Missenden).

In addition to the above, competitors in this competition were awarded 3 Very Highly Commended Diplomas, 6 Highly Commended, and 10 Commended.



A Column of "Live Steam."

By "L.B.S.C."

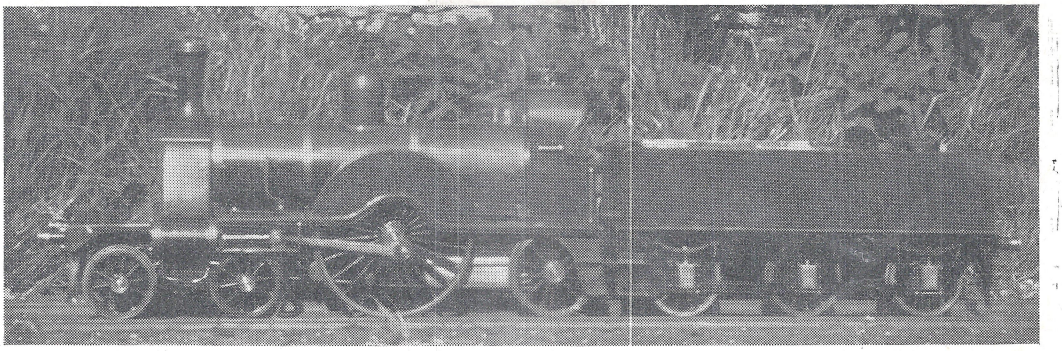
The "Dyak" Competition.

Well, it's all over! The prize has been won, and the excitement has died down; so now, as the arab who designed—and what is more important, actually built—the locomotive which the competitors had to tackle, I guess I'm entitled to a little reminiscence and comment on the competition itself, the competitors, and the engines that were entered. First of all I want to make it quite clear that I took no active part in the judging, beyond examining the engines on show at the Exhibition, and expressing an opinion as to which was best and second-best in workmanship; I was only at the Horticultural Hall a total of some four hours or so during the whole time the Exhibition was open, and did not see any of the engines under steam at all. For all that, I am perfectly satisfied that the prize was justly and fairly awarded; and had I been sole "judge and jury," the result would have been the same. I sincerely hope that statement, and the following remarks, will clear up all points raised in conversations, both personal and overheard, at the Exhibition.

Genesis of the "Dyak" Locomotive.

When Mr. Marshall showed me the casket in 1934 and asked me to get out a design for a locomotive for competition, I was in a bit of a quandary, for a suitable "beginner's job" isn't a thing you can trot out in five minutes; there are such a lot of items to be taken into account. The ideal competition is one where all entrants start equal, but it was clear that some of the "Dyak" competitors would be better equipped and could work quicker than others; and even though "beginners," they would make short and easy work of an engine which others, not so well furnished, would find a formidable task. I consulted the donor of the casket, Mr. Geo. Stevenson, on this point; he suggested an inside cylinder 4–4–0, and made out a table showing a system of giving "marks" for general workmanship, auxiliaries, performance, etc.; but from my huge correspondence I know that a large number of tyros look askance—to put it very mildly—at putting the whole of the "works" in the confined space between a pair of 2½" gauge frames. Then again there is the question of hauling power. Most builders like to see their engine shift a Bill-Massive-size load, even though it be a first attempt, and a long-way-below-first-class workmanship; and the "bite" of a four-wheels-coupled job, plus the space limitations as mentioned above, do not leave much for what you might call "constructional discrepancies." Eh—what's that? Well, perhaps you mightn't—but the B.B.C. announcer would, anyway, so let's leave it at that!

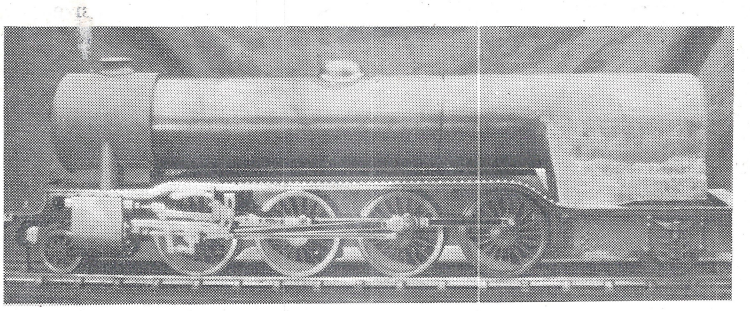
To cut a long story short, I carefully weighed up all the pros and cons, and in view of the fact that all four British railway groups use "Mogul" type engines on all classes of work, decided on that pattern, and schemed out a composite design that could afterwards be dolled up to look like any particular company's engine favoured by the builder. Not only that, but it would make a nice job for anybody to start on, outside of the competition, and would bring in castings and material already on the market, thus avoiding the need of special patterns, and doing a good turn to advertisers and customers alike. After studying photo.-illustrations of various 2-6-0's in the *Locomotive* magazine and other engineering journals, I made out a rough outline sketch of a suitable engine, incorporating a straight-topped boiler, outside cylinders, small driving wheels, and the minimum of blobs and gadgets. The valve gear was a simple but robust Walschaerts which could be easily made by any tyro, and the dimensions of it were obtained by my usual "bent-tin-and-pins" process. The result seemed pleasing; so I then, after much laborious exertion, and the use of about 1½ tons of india-rubber, managed to put on paper the outline from which the illustration showing the general arrange-



One of the Old Brigade (built by Rev. H. T. Brown, of Ballycastle)—

ment in the issue of September 6th, 1934, was eventually made. Believe me or not, just as you prefer, but in the whole business from A to Z, that was my hardest task!

My correspondence, as I've remarked before, tells a tale; and there had been so many complaints from good folk, especially beginners, that they had worked to a drawing and then found something or other didn't fit, or wouldn't come right, and so on and so forth, that I made the vow on the spot that there shouldn't be any complaint of that sort in the competition engine, that could be laid at my door; I'd build the engine myself, designing the details as I went along, and make sketches and give instructions *from the actual job*. Then there would be no mistakes and no quibbling over details, and the idea worked O.K., for out of the whole of the letters received about the "Dyak" engine (close on a thousand all told), there have been only about half-a-dozen querying any alleged fault in the detail or instructions. The amount of free direct information I have given on various subjects, such as machining and fitting where tools and appliances were very meagre, and explaining the whys and wherefores, would fill up a couple of issues of this journal. In the construction of the "Dyak Queen" herself, everything went off without a hitch, even the valves came right without any special setting; and as to the load she can pull, well, I'm not telling. I've been called names before! So much for the engine.



—and one of the New (being built by Mr. F. Day, of Nottingham).

The Competition

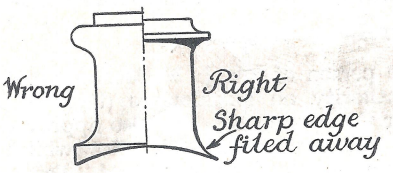
The terms of the competition were certainly fair; I don't think anybody could have found fault with the conditions, or bettered them. Mr. Marshall drew up the original draft; Mr. Stevenson, as donor of the prize, and your

in the person of Mr. J. N. Maskelyne, who is an authority on locomotives (big and little) if ever there was one. He also approved, and so the terms were published. Now whilst I was taking a looksee at the string of "Dyaks" on the stand at the Exhibition, I heard it remarked that it was a shame to give such a beautiful prize for a humble beginner's job, and the casket should have been put up as a prize for the best locomotive, irrespective of design and size, and open to skilled workers. Most emphatically, no! Mr. Stevenson's idea was to encourage beginners; and by offering a reward that was really worth working for, he has stimulated the efforts of tyros all over the country, far more than he ever knows. I know, anyway, and so do our advertisers, who have sold a large number of castings and material for building the engines. However, I freely admit that one mistake was made—not sufficient time was allowed to complete the job. Another three months would have produced four times the number of entries; and had the casket been awarded at the 1936 Exhibition instead of the one just closed, the entries would have occupied a considerable part of the Annexe, whilst steam trials would have had to be run off in heats—in more senses than one! I know of quite thirty would-be competitors who gave up the running in the early part of the summer, knowing they could never get the job done in time, and these engines will be finished off in due course, at their builder's leisure. Incidentally, I've been thinking that maybe a contest could be arranged, say on the Romford track, or on the new Polar route when completed, or any continuous open-air line available, in which such engines as those

it would give some measure of consolation to those who started in for the big prize and couldn't keep up the speed. Any comments?

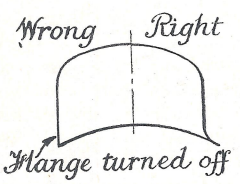
The Engines.

From the remarks I overheard when standing by the row of "Dyaks," it was quite obvious that *very few people appreciated that all the engines were the makers' first attempts*; and taking this into consideration, I don't think there was very much to grumble at. Every one of them was about a million miles in front of *my* first attempt, any-old-how—made when I was ten! But joking apart, you could see



"Dyak" Chimney.

that the builders had been trying hard; nobody can do more than their best, and it is a shame to make uncalled-for remarks and throw cold water on sincere efforts. As to the engines themselves, there was not the slightest doubt that Mr. Hills' was the best of the bunch. He had followed the instructions carefully, made a very neat job of the smokebox front, and taken great care over the footplate fittings. The wheel and screw reverse deserved a commendation. It was optional to fit either lever, or wheel and screw. Most of the competitors preferred the lever. Now, to get the lever to move over the full range of the quadrant, it has to go up into the space between the boiler and cab, when in full forward gear, same as in big practice. This was attacked as an example of "bad design" (although akin to real practice) on the score that it could not be operated without burning your fingers. I'm afraid that the fault-finders didn't exercise their thinking apparatus overmuch, or else they would have realised that the lever can be operated from the back of the tender if necessary, by a simple device such as used by Mr. John Matthews on his American "Atlantic" when she ran on the Exhibition track some years ago. I use one, too; and it consists simply of a piece of

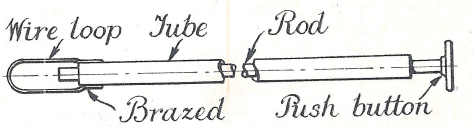


"Dyak" Dome.

tube with a wire loop at one end. A rod runs through the tube, and on the end of the rod is a "push button." The loop is slipped over the lever, and the trigger lifted by pushing the button; the lever can then be pushed back and forth as desired, with no burnt fingers and no trouble whatever.

I do like to see a nice neat arrangement of fittings on the backhead, and the fittings themselves made with what friend Maskelyne would call a sense of proportion. Some of the engines had clumsy regulator handles and reverse levers, whilst the wheels on the gauge blowdowns, and the blower valves, were far too large. On my own engine they are 7/16" diameter, which is plenty large enough to operate easily, yet small enough to avoid any suspicion of clumsiness. I hope to publish a picture of the Queen's backhead soon, and then those competitors who erred on the large side with their fittings, will see what I mean.

Another item which caused our Dyak-builder brothers some trouble, judging by results, was the chimney. One had a chimney just like the neck of a bottle, with a big rounded flange, and a base to match. It only wanted a cork in it to complete the picture! Another one was far too fat in the body part, the rim and base being very little bigger than the middle. Another had a flat flange on top of the smokebox, with a flat-based chimney fixed on it by four screws, reminiscent of the early days of locomotives. In several cases, no attempt had been made to round off the sharp edge left after turning the chimney, and the sketch shows the effect. Same with the domes; in one case the flange at the bottom had been turned completely away, and in another, it had been turned off at front and back, and left on at the sides. The safety valves on one engine were



The "Matthews" Reverse Lever Operator.

very much outsize, and a couple of the engines had the window frames outside the cab instead of inside. One engine was painted L.M.S. red, and another L.N.E.R. black, but the painting was hardly up to the railway Co.'s standards, and in my humble opinion, the engines would have looked better "naked and unashamed."

Several of the locomotives seemed to bear out the opinion that the time allowed for building them was not long enough, for whilst the chassis and motion work was obviously very carefully carried out, the boiler, top works and trimmings bore decided evidence of being finished off in a hurry. I heard the remark passed by several visitors. The boiler of one engine appeared to be lower at the smokebox end than at the cab end, and some of the platework was a little more rough than it might have been, had the builder spent a little longer "finishing off." As to the wheels, cylinders, motion and chassis work generally, considering all the engines were only beginner's jobs, this wasn't bad at all. Several of the valve gears were on the sloppy side, the builders evidently having used drills for their pinholes, which were cutting oversize. Tip: if you've the slightest suspicion that your drill is not ground absolutely correctly, always drill a hole several sizes smaller, and put the correct size drill through afterwards; then you'll get the resulting hole the size you need it. For example, a No. 41 drill ground slightly skew-whiff may drill a 40 or even a 39 hole, and a

piece of 3/32″ silver steel used as a valve gear pin in such a hole, will flop about all over the place. Three or four such joints in your valve gear, and you can move the valve half its travel without turning the wheels! However, if you put, say, a 48 drill through first, and follow it up with the No. 41, the hole will be right size, and the pin will fit without shake. Bushes should be drilled in the same way. The trunnion bushes for the links on at least three of the "Dyaks" had been evidently drilled with a badly-ground drill, and the links could be wobbled from side to side. Incidentally, in wangling out the valve gear in the first place, I made allowance for what I call "beginners' joints," and even with a fair amount of play in the pins, forks and bushes, the engine should pull and go quite well.

I did not see the winning engine tested on the track, but was told she slipped a lot. If the track was like I saw it on the Friday morning, I don't wonder a little; but I beg to remind all and sundry that any full-sized engine will slip, if the regulator is operated in the way that Reggie the knut operates the accelerator pedal of his super-sports Fumigator when he is showing Edna the flapper how quickly he can get off the mark! It seems to be the fashion among many amateur enginemen to smack the regulator wide open. The full-sized fraternity never do silly things like that; and yet you still see in print the statement that "so-and-so's cylinders *must* be too big because she slips if you open the regulator too much!" As stated a couple of weeks ago, I can get the Queen away with five adults behind her, with very little slipping on a track without sand. With sand, she wouldn't slip at all with an outsize load, and doesn't need any sand for normal loads.

When I called in at the Exhibition on the Friday morning, the engines were being tried one by one on the S.M.E. compressed air plant to find out leaks, blows, and other little items of interest, and I was shown a list of defects which looked like a page from the report book in the driver's lobby; but I don't think an air test such as was given to the engines, is quite fair to them. True, it shows up "faults in sundry places"; but, for instance, leaks around stayheads "take up" in many cases when an engine is in steam—it'd be pretty bad for a good many full-sized engines if they didn't!—and an engine tilted up to an angle, with air going in at high pressure through the boiler feed clack, bubbling through water, and blowing a mixture of air and bubbles down into cold cylinders, is not going to tick over like a Rolls Royce, especially when the axle boxes have dropped to the bottom of the slots and thrown the valve setting out.

Well, I guess I've said my piece on the subject. I understand that the good folk who judged and tested the engines will be issuing a full report on the matter; so until then—'nuff sed!

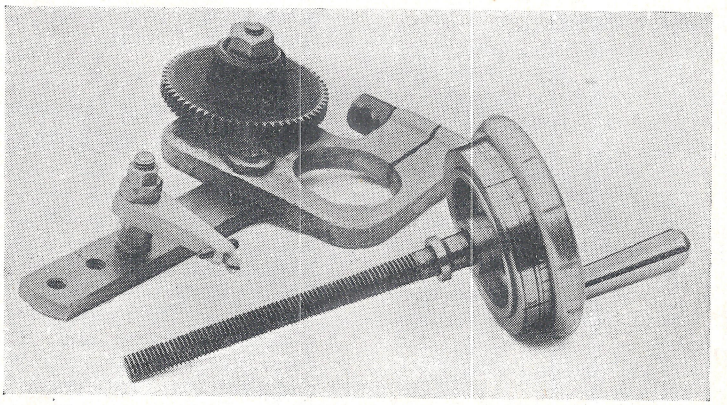
Uncommon Uses for Lathe Change-Wheels

By E. A. HANNEY, M.Eng.

THE change-wheels of the lathe are primarily intended for use in cutting screws which have some simple relation to the lead screw. Special wheels allow a conversion between English and metric threads. But, as recalled below, there is one important set of standard threads (B.A.) which belongs neither to the English nor the metric class, from the point of view of lathe change-wheel trains. The amateur who wishes to cut such threads in the lathe must perforce approximate, and directions are given below for systematically finding the wheel trains which give the results nearest to the standard.

The amateur's change-wheels are also used as dividing plates, the number of possible divisions being to some extent limited. Now there are occasions when extreme accuracy is not essential, so long as *cumulative* errors are avoided; the writer made some awkward divisions of this type by using *compound* trains for dividing, as described below.

The lathe directly concerned in these descriptions is a Wade, with Aird screw-cutting equipment. But the methods can be quite generally applied.



The Indexing Attachment, and a Graduated Collar, produced by its aid.

Change-Wheel Trains for B.A. Threads.

It is difficult to get over the feeling of wonderment that the engineering industry ever accepted the British Association's very

odd pitches. No. 0 B.A. is a plain metric thread, but No. 1 B.A. has a pitch of 0.9 mm., and No. n B.A. a pitch of $(0.9)^n$ mm. Thus, with the exception of 0 and 1 B.A., no ordinary change wheel equipment will yield *accurate* pitches.

The wheel-trains for approximate B.A. pitches can easily be found by using the *slide-rule* and trying combinations *systematically*. (Of course, a slide-rule can be dispensed with, but the investigation is then very laborious.)

The ordinary rule is:

$$\frac{\text{followers}}{\text{drivers}} \times (\text{lead-screw t.p.i.}) = (\text{required screw t.p.i.})$$

Now the lead screw being fixed, it is really a ratio of followers to drivers which is sought.

Thus, when the writer wished to produce 5 B.A. threads, 43 threads per inch, using a lead screw with 12 t.p.i., he wrote down:

$$\frac{\text{follower}_1 \times \text{follower}_2}{\text{driver}_1 \times \text{driver}_2} = \frac{43}{12} = 3.583$$

Then he tried the two smallest drivers, 27 and 30, and found:

$$\text{follower}_1 \times \text{follower}_2 = \frac{27 \times 30 \times 43}{12} = 2902.5$$

On the slide-rule this figure is quickly divided by each possible value of one follower; those answers which come within 1 per cent. or so of the value of another follower are noted down.

Now, the next pair of drivers, 30 and 30, is treated in the same way. Then 27 and 40; then 30 and 40, and so on up to 40 and 60; larger figures are unnecessary, as they call for larger followers than are available.

The possibilities are now collected, and prove to be numerous. The most accurate train is found to consist of the wheels 85, 95, 75 and 30, for this lead screw. Unless it is found that these wheels cannot be mounted to mesh properly, this train is adopted for 5 B.A. threads.

In this way the writer has fulfilled all his requirements from 0 B.A. to 10 B.A., the pitch errors being kept within 1 per cent. It should be added that in all cases *compound* trains were assumed; then if one driver and one follower came out the same, they were cancelled to leave a simple train.

Compound Trains for Dividing.

The use of wheel *trains* for dividing is bound to introduce certain errors, but these will not be cumulative. The errors will be minimised by using a detent, properly mounted, to engage the required tooth, whilst the play is carefully taken up in the same manner in every division.

The writer wished to produce two micrometer collars, of the loose type, for the hand wheels of his lathe. The Wade slide rest screw has 22 t.p.i., and the lead screw 12 t.p.i. Hence if one division on the micrometer is to represent .001 inch, there must be 45 5/11 and 83 1/3 divisions in the circle, on the respective collars.

One of these collars engraved by means of a scribing tool on the tool post, is shown in the photograph, the collar being mounted on the hand wheel. The simple detent device is also shown, secured to the banjo plate.

The method of producing an odd division, such as the above, is as follows:

The wheels are put on lead screw (clutch disengaged), intermediate stud, and spindle. Two wheels are used on both lead screw and intermediate stud. Thus, wheel No. 1 is on the lead screw and its tooth pitches are engaged by the detent; No. 1 is keyed to No. 2, which engages with No. 3 on the intermediate stud; this is keyed to No. 4, which gears with No. 5 on the spindle.

Then the rule is:

$$\frac{\text{No. 1} \times \text{No. 3} \times \text{No. 5}}{\text{No. 2} \times \text{No. 4}} = \text{divisions in } 360°.$$

In this rule, each term, such as "No. 3," means "the number of teeth in wheel No. 3"; but for No. 1, a submultiple of its number of teeth may be used, the detent being engaged with every alternate tooth, or every third tooth, etc.

In the example illustrated, the rule resulted in the choice of wheels, as under:

$$45\ 5/11 = 500/11 = \frac{40 \times 75 \times 50}{60 \times 55}$$

Wheel No. 1 was actually the 40, and movement through one of its tooth pitches gave the required division on the collar in the chuck. But if desired, the wheels in the numerator of the expression may be changed about without affecting the result; similarly for the wheels 60 and 55, in the denominator.

In the second example quoted,

$$83\ 1/3 = 250/3 = \frac{40 \times 75 \times 50}{30 \times 60}$$

and again one tooth pitch on No. 1 corresponds to one division on the micrometer.

Of course, some simpler divisions do not need five wheels. Thus, to index 100 divisions in the circle, no wheel being available with 100 teeth, only three wheels are needed (nos. 3, 4, 5 in the description above), so that:

$$100 = \frac{50 \times 80}{40}$$

The first shot may easily result in wheels which will not mesh in the space available; in this case, try the possibility of doubling No. 1 and using every other tooth, etc. Or alter a wheel in the numerator and one in the denominator in the same ratio. A little perseverance will usually enable a suitable train to be found.

The British Oxygen Co's. New Service Department.

The duties of the original Welding and Cutting Department and the Exhibitions Department of the B.O.C. have now been transferred to a new department under the management of Mr. C. G. Bainbridge, which will handle all business connected with technical service, advice and instruction, exhibition matters, lectures and demonstrations. All correspondence on these subjects should be addressed to The British Oxygen Co., Ltd., Sales Technical Service Department, North Circular Road, Cricklewood, London, N.W.2.

First Steps in Model Engineering.

Workshop Advice, Experience and Philosophy for Readers of all Ages.

By "INCHOMETER."

A Change of Clothes.

Following upon my remarks in last week's issue, and as a substantial contributory to comfort and recuperation of mind and body, I will advocate that you change into another suit of clothes when you are taking to your model engineering hobby after the day's occupation is finished. My own usual practice is to change the suit entirely, the linen also, and footwear. An old suit, too worn perhaps for the public eye, easy collar, kept for the specific purpose, gives restfulness by very reason of the change from the clothes which one has been wearing during other hours. Regarding a necktie, do not wear anything which is loose and of texture which may catch against rough material and hang to it. An apron or overalls, though preserving clothes from being soiled, will not alone give restfulness of feeling, as will be obtained by complete change of garments.

Drills and Drilling.

A correspondent desires me to emphasise to you that if a drill is ground so that the point is not axially central, the diameter of the hole produced will be larger than that of the drill itself. This effect is known to mechanics, and care is taken when grinding a drill to ensure that the point is not to one side of the centre line of the drill. For example, if you have ground the point of a twist, or a straight fluted drill, and grip the shank in the chuck of a drilling machine or a lathe, the point should not wobble when the drill is rotated. If it wobbles, the point is out of centre ; in fact, you have ground away more of one cutting edge than of the other. Therefore, correct the error by regrinding until the point runs truly central. This assumes that the drill is not bent or runs untruly as a whole, so that you obtain a false observation of the action of the point. Similarly, with a flat spear point drill, the point should be correctly in line with the axis.

Occasionally a mechanic will deliberately grind a drill so that the point is slightly to one side of the centre, because he wishes that the hole shall be larger than the nominal diameter given by the drill, and he does not have a drill of exact size. Precise mechanics may not condone practices of this sort, but you will find various instances where subterfuge and dodging accurate and correct practice will be a convenience in effecting the purpose of the moment. A belief, natural to a beginner or worker who has not acquired much experience, is that a drill produces a circular hole. In this I am touching on a refinement. If a drill is properly ground and used, it can produce circularity near enough for general requirements. Where it is necessary that a hole is to be circular within small limits, that is, as near as can be obtained by machine cutting operation, the hole should be drilled to a slightly smaller diameter than finally required. A rose bit of correct final size should then be used ; a reamer does not necessarily give true circularity, and should not be relied upon to produce this. A drill alone may produce a hole which is considerably out of circularity, approximating to triangular, polygonal, lobed or elliptical. Use a pair of inside callipers ; with delicate touch you can detect such departure from circularity. Just a reminder that there are three sizes of drill for a nominal diameter of hole, namely clearing, fitting and tapping. A clearing drill gives a diameter slightly larger than that of the bolt, stud, or screw which is to go into it. This is to give some tolerance or ease of position, or so that the bolt or stud will remove freely if liable to become fast in the hole through rust, corrosion, stress or clogging. A fitting drill is used when the bolt or stud is to fit closely in the hole and, apart from the matter of exact finish with a rose bit, is of nominal size to the diameter of the bolt or stud. A tapping drill is used when a screw thread is to be cut in the hole. Its size is less than the nominal diameter, because enough material must be left to form the screw thread. Note this, because it is easily overlooked ; you desire, for example, to drill and screw tap a hole of, say, $\frac{1}{4}$ inch diameter and, forgetting to allow for the depth of the screw thread, select a $\frac{1}{4}$ inch diameter drill ; you then find that the screw tap passes free through the hole.

Speeds of Drills.

A difficulty you will encounter is with obtaining high speed of rotation needed by drills of small diameter. Speeds given by treadle-driven lathes of usual 3 to $4\frac{1}{2}$ inches centre height, and by hand or treadle-driven drilling machines are in the nature of hundreds of revolutions per minute. If you calculate the cutting speed, by reference to pocket book tables, which should be given for a particular material, you will find that the rotational speed required with small diameter drills is thousands, not hundreds, of revolutions per minute. The result of running a small drill at the obtainable low speed will be that you are liable to bend or break it, because the applied pressure exceeds the rate of cutting, the drill does not have time to do its work in proportion to the attempted rate of feed. Deal gently with the drill, avoid forcing, humour its action, withdraw it repeatedly and clear away cuttings from the points and grooves.

The "sensitive" type of drilling machine, in which pressure on the drill is applied by means of a lever, is designed to enable the operator to feel the cutting action of the drill. Thus he senses the pressure applied, can readily withdraw the drill from the hole, and apply it again and again with gentleness to prevent breakage or bending. With the screw feed generally fitted to an ordinary lathe tailstock, one can only obtain sensitiveness by gentle manipulation of the hand wheel or handle. A screw exerts great pressure with quite small turning force applied to it. The smaller the drill, the higher the speed, and more the delicacy of feed manipulation to be used.

Marking-Off and Measurements.

If you are "setting out" a number of holes or positions, average the setting or dividing. If you are marking a series of equidistant positions, as for a line of rivets, and having adjusted your dividers to the separating dimension, commence at one end of the line, then continue stepping along the series to the other end, any error in your dividers adjustment will accumulate. Probably you will find that the positions of the holes will become more and more out of place as your marking-off proceeds. The advisable method would be to mark the two extreme holes first, then divide the distance between them into two parts. Next divide each of these distances into two parts; continue to subdivide in this manner until all positions are marked in. Similarly, when setting off around a circle, divide the circumference into halves by accurately drawing a straight line through the centre. Bisect each of these halves, bisect again and so on until all divisions are marked in. Follow this plan with all setting out of positions, it will avoid accumulation of initial error. An initial carelessness or haste, giving a wrong position or dimension, and persisted in through disinclination to rectify it, even to the extent of commencing the work afresh, will be liable to follow your further procedure all through the construction into its completion. Plan, set off, and measure by system to avoid initial and cumulative error; satisfactory ending depends upon soundness of beginning.

A Design for a 1½" Scale Four-Coupled Shunting Tank Locomotive.

By GEORGE GENTRY.

(*Continued from page* 335.)

The Boiler.

Fig. 24 is a general longitudinal vertical section of the proposed boiler, which is designed to work at 100 lbs. per sq. inch. In this, main dimensions only are recorded, and a further specification will fill in many of the gaps in detail. In conjunction with it, Fig. 25, to the same scale, is a composite cross section, showing in diagram a cross section of the Belpaire wrapper of the firebox shell, a front elevation of the firebox within it, and, superimposed, a cross section of the boiler barrel.

Further scale sketches will indicate the elevation and stay arrangement of the firebox shell back plate, the front jointing of the smoke-box, the dome and complete regulator together with the steam supply, the safety valve and its mounting, also the grate and ash-pan arrangement. A dimensioned setting out of the tube arrangement at the firebox end will have to be given also.

As seen in the cross section, there has to be some 5/16" clearance between the inside of frames and outside of fire-box shell wrapper in order to clear a portion of the rear hornblock flange. This will entail a detail of the method of centring the boiler, and by the same, supporting it on the frame top (not indicated here). The following points will help to explain the drawings.

The whole boiler, with the exception of the firebox, front tube plates, and the tubes, to be constructed in ⅛" copper, the barrel being of 6" outside diameter tube of that thickness. The tube plates to be of 3/16" copper and the tubes 18 S.W.G. copper ⅝" outside diameter.

The total length of barrel from throat plate is 14⅛", as given, with an inset to the drum head of 15/16". This gives a distance of 13⅛" between tube plates, and adding to this twice the plate thickness (⅜") and twice the 3/32" overhang of tube (3/16"), makes the overall length of tubes 14 3/16". The tubes are to be properly expanded in and slightly bell mouthed at the overhang, and in order to obviate tendency to distort the plates, the minimum distance apart at perforations is 3/16", making the minimum distance apart of tube centres 13/16", but most will be found to exceed this. The tube setting out to be geometrically balanced each side of vertical centre, and to be identical in the front tube plate, except that the centre line of the whole system is to be elevated ⅛" higher at front as taken in relation to the invert of the boiler barrel which should be level.

The wrap of the riveted joints to be ⅝" centrally placed 3/16" copper snap head and tail rivets, normally pitched at 9/16". The latter will entail 34 rivets equally spaced at the throat plate end and 32 rivets at the drum head. Firebox side and end stays of copper, ¼" diameter, screwed full length 40 t.p.i. and riveted over at both ends. There is a system of 12 stays per side, pitched at the mean as given on the drawing; the second row from the top will be inclined upwards out to inside as seen on the cross section. There are four (somewhat longer as will be described later) at the throat plate, but the arrangement at rear must await this setting out. Firebox roof stays, 12 in number, and pitched as given on drawings, ¼" diameter, all screwed 40 t.p.i. all the way, and nutted with "*gunmetal*" nuts at tops of wrapper and inside crown of firebox. All these stays to be fitted to aligned tapped holes in wrapper and firebox plates, to be tapped with second taps (not taper) and to be a distinctly tight fit.

Firebox shell cross stays, four in number, pitched evenly between vertical stays on a line 2" from crown of shell, 9/32" diameter by 40 t.p.i. at ends, reduced to the ¼" core diameter between threaded ends, and fitted with gunmetal nuts on the outsides.

Longitudinal copper stays above tubes, two in number, 3 inches centres apart, on a line 2⅜" from crown of firebox shell, and 1½" centres on each side of vertical boiler centre. These stays are threaded at ends, ⅜" diameter by 32 t.p.i., reduced to 5/16" between threaded ends and

fitted with gunmetal nuts on outside of front tube plate and rear shell plate. The length overall of these plates, as taken from drawing, is 1′ 9 3/16″. In the case of such stays as are to be riveted, they should be annealed at both ends, after screwing, and previously to riveting.

The water space around firebox at the foundation to be, at sides and back, $\frac{3}{8}$″, but at the throat plate $\frac{1}{2}$″. The object is to provide both down and up circulation at the front. The coldest part of barrel is at the invert at the front

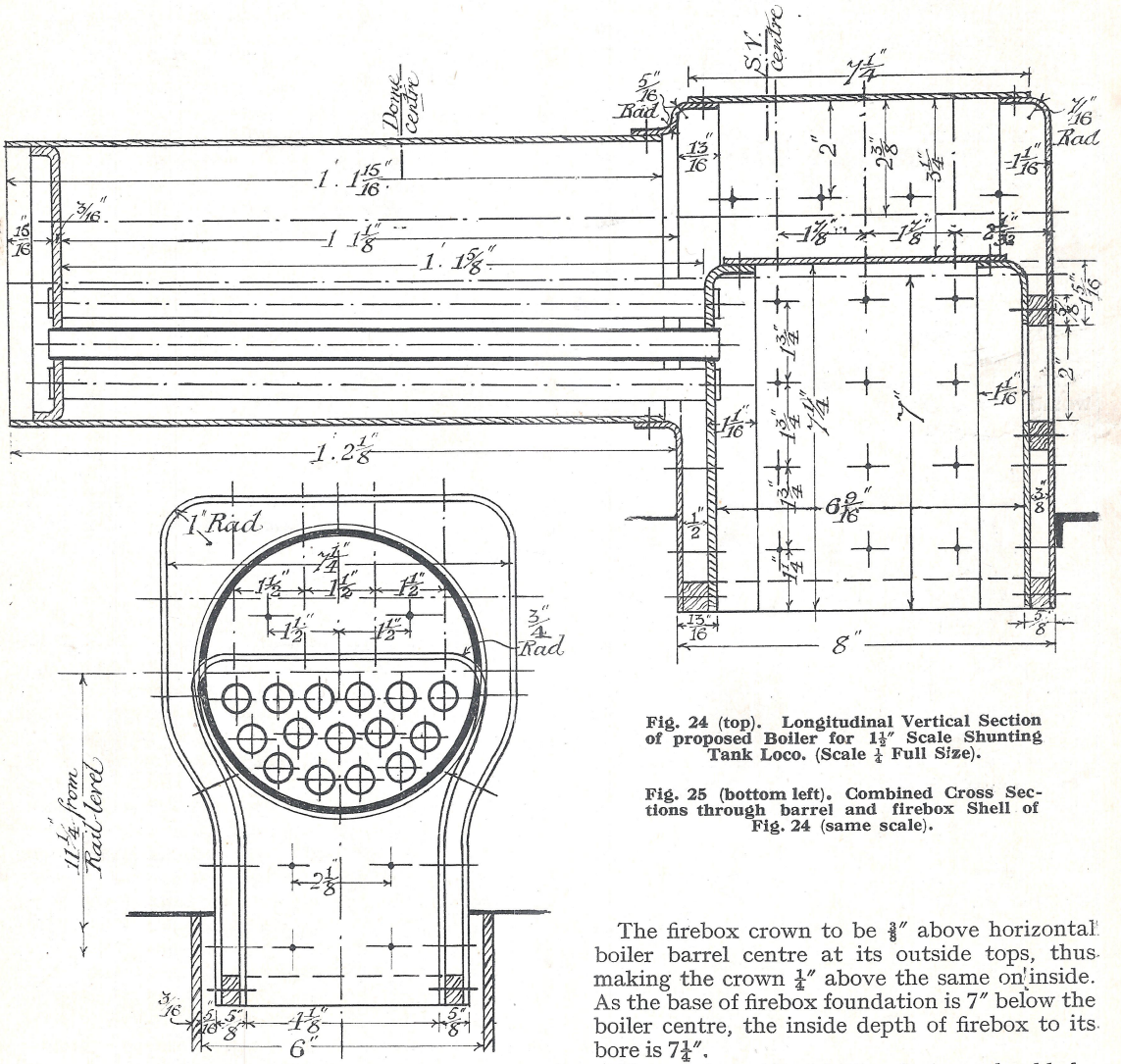


Fig. 24 (top). Longitudinal Vertical Section of proposed Boiler for 1½″ Scale Shunting Tank Loco. (Scale ¼ Full Size).

Fig. 25 (bottom left). Combined Cross Sections through barrel and firebox Shell of Fig. 24 (same scale).

end, and the tendency of the heated water around firebox is both upward and outward. This causes the colder water to flow backward, and in order to feed the firebox water space, it must flow down between the throat plate and front plate of firebox. If this space is at the minimum, the upward flow will interfere with the downward feed, but being made somewhat wider, the colder water flows down and then all around sides and back.

The foundation ring of copper should be $\frac{5}{8}$″ deep, with 3/16″ rivets, and the method of fitting it to the scarfed laps of the firebox wrapper at bottom will be given by means of a cross sectional plan later. The rectangular ring will of course be $\frac{1}{2}$″ wide at front and $\frac{3}{8}$″ wide on three other sides.

The copper firehole ring is $\frac{5}{8}$″ deep by $\frac{3}{8}$″ wide, with 3/16″ rivets, but the actual dimensions and setting out will be given in a later sketch. The clear opening will be $2\frac{5}{8}$″ long by 2″ top to bottom, but its shape will be nearer an elongated circle than a true ellipse. It should be arranged that its annular periphery stands above the opening in plates between which it is riveted.

The firebox crown to be $\frac{3}{8}$″ above horizontal boiler barrel centre at its outside tops, thus making the crown $\frac{1}{4}$″ above the same on inside. As the base of firebox foundation is 7″ below the boiler centre, the inside depth of firebox to its bore is $7\frac{1}{4}$″.

The water side of the firebox should be caulked with silver solder all along seams and rivets before it is finally put in place, and the heating apparatus for same to be recommended is an oxy-coal-gas blowpipe.

The method of caulking the boiler will be described later and is to be recommended, but it can, alternatively, be caulked with silver solder run as described above.

The boiler, to work at 100 lbs., should be treated by warm water up to 200 lbs., and under steam up to 150 lbs. per sq. inch.

(To be continued.)

Metal Polishing for the Model Maker.

By H. J. WYATT (of Norwich).

THE writer, himself an amateur model maker and a member of that distinguished fraternity who are never happy unless engaged in some home work, has in the course of a varied experience, managed to accumulate a few tips regarding metal polishing.

Naturally, every enthusiastic amateur wishes his models to look as presentable as possible, and no one can deny that the appearance of a model is considerably enhanced by polish in the right places. But polishing is an art at which few excel, and those who find the finishing of a model a wearisome process, may be helped considerably by one who has studied this question, and who has experimented considerably to cut out the laborious part, and to find a quick and sure way to improve the appearance of his jobs.

Preliminary Operations.

Let us therefore start right at the beginning and see of what a polish consists. The elimination of scratches is the obvious answer, and paradoxically enough, we shall be compelled to scratch our work to get rid of scratches. This brings us up against a great difficulty, and I would earnestly beg every M.E. to use as his gospel, "If you want to get the scratches out, don't put 'em in." But it is alright telling a fellow not to put scratches in, the question is, how can it be avoided, or if perchance some do get in, how to get them out?

Well, taking mild steel or annealed cast steel as one of the most difficult subjects, we all know that filing is difficult, owing to the habit the file has of "pinning," that is, little pieces of metal get caught in the teeth of the file and cut small grooves in the job,—nasty scratches and usually very deep. Some people advocate the use of chalk rubbed on the teeth of the file, or oil applied to the work. Neither form of treatment is a cure; a lot depends on the state of the file, the pressure applied, and the speed of motion. Practice will help a man to get good results with a file and avoid pinning, whilst another user will get pinning on the same job and the same file! So don't blame your tools too readily, seek to find a way out and master any eccentricity that is causing perplexity. Draw filing, if done carefully, is usually very successful in producing a fair surface. Choose your smoothest file, select the end nearest the tang—where you will notice the lines are not crossed—use light even strokes, and often tap the file on the bench to remove the filings which tend to cling to the teeth. You will be surprised at the result, if you don't hurry matters.

The Use of Emery Cloth.

Having got a fair surface on the job, consisting of course of a multitude of scratches, but none deeper than the others, the next step is to remove these, leaving much finer ones, and so on, until the desired polish is obtained. Emery cloth wound round a stick or held under the face of a file is usually the next step, but here a word of warning may well be given. Up till now, the job is true and square, the filing having produced the faces and shapes which we desired; but as soon as we use emery cloth on the job, we begin to lose control of the *shape* of the job. Corners that once were sharp and distinct begin to lose their shape, get rounded and blunted, and the general appearance of the job at once begins to suffer.

For those who possess a lathe, the remedy is simple. Get a piece of $\frac{3}{8}$" plywood, circular in shape, as large in diameter as will run in the centres, and drill four-countersunk screw holes to come in line with four slots on the faceplate of the lathe. Drill the holes $\frac{1}{4}$", put 5/16" tap through plywood, smear a little "Certofix" (Woolworths, $1\frac{1}{2}$d. per tube) in holes, screw in four 5/16" countersunk screws and leave for a few hours to dry. A new sheet of No. 0 emery cloth is then obtained, the back of which is smeared with Certofix and then laid on the clear face of the wooden disc. Clamp between two boards in a vice, or what clamps you have, and leave overnight. Next day, cut away emery cloth around edge of disc, and you have a disc grinder ready for attachment to the lathe face plate. A few minutes experiment with this gadget will be a revelation to those to whom it is a stranger.

A very fair polish can be obtained from such a disc, that is to say the scratches are much smaller, more numerous, and even more regular. You notice that the emery cloth is held rigidly to a flat surface, and does not now take the corners off, wherein lies its usefulness.

Final Polishing.

The next step is to polish the job, so that it can be left as a finished surface. We have to seek a further method of scratching the surface, to produce even finer scratches, so that they are invisible to the naked eye. Obviously something softer than emery cloth is desired. The writer uses a similar disc of plywood to that described above, but when the 5/16" screws are set hard, another disc of 3/16" plywood is screwed to it to form a false face. Take a light cut across with a sharp tool to true up the surface. Then stick a circle of green baize, old billiard cloth is ideal for the job, or any similar durable material that you may have handy, to the face, leave to dry, and the polishing disc is ready.

Now for the polishing agent, and here is the rub, in more senses than one. Practically every well-known preparation has been tried during the past 25 years, and many of the trade polishes too, but the writer unhesitatingly pins his faith to an old fashioned preparation, "Globe" polish, a semi-solid with a greasy base. This adheres well to the disc, chunks do not fly off into the user's eye, as do many of the "liquid" polishes, and it produces a lasting polish. You observe the "lasting" polish. We are still using steel, and, remembering that we are making scratches, but of course very tiny ones, it follows that the scratches will be left, no matter what polishing agent be used. It has been found in actual practice that steel, polished with a

greasy agent, retains its polish far longer than with the liquid polishes. Think it out, you will see the reason why.

Smear a little of the "Globe" on the face of the disc, keeping as near to the edge as convenient, lightly press the article against the face, and a polish will soon be obtained. Don't be alarmed if the part polished gets black from the fingers whilst working on another part; remember that a polish is the result of something taken off, not something put on. Just rub the job with a clean rag and you will see the polish all right. So much for Steel, and with regard to turned work, I think it hardly necessary to say that the application of emery cloth to turned work should rarely be necessary. Turning tools should be sufficiently sharp to leave a nice surface, requiring only a final polish, and this is easy with circular work. A useful tip when polishing small turned work is to make a small clamp of two pieces of hard wood, say $\frac{5}{8}$" square by 6 inches long, screw a small piece of leather across the ends to form a sort of hinge, and use this gadget to put a little pressure upon the work, by inserting the work between the jaws and lightly gripping the open ends with one hand. A bit of "Globe" on the bare wood will produce a fine polish. Of course, if you HAVE to get out tool marks, a piece of fine emery cloth placed between wood and job will help matters considerably.

Non-Ferrous Metals.

With regard to Gunmetal and Brass, the same methods apply, except that the metals are easier and yield more readily to treatment. For the very rare occasions when the shape of the work prevents it being applied to the face of the disc, get a piece of hard wood, about 1" wide by $\frac{1}{4}$" to $\frac{3}{8}$" thick, and 8 to 9 inches long, and Certofix a piece of thin leather on one of the faces. Try to persuade Tom or Dad that he wants a new razor strop, his old one is just what you want. This "buffstick," as any old soldier will recognise, will be found very useful for the awkward jobs, used in conjunction with "Globe."

I repeat, don't be alarmed at the appearance of the job when using either the disc or the buffstick, it merely needs a rub with a rag to take off the metal removed by the "Globe," and the excess of polishing agent.

Perhaps by now, I have made my contention clear, that a fine polish is something taken off, not something put on. The final clean-off that shows a brilliant polish was not polishing at all, *that* had been done already.

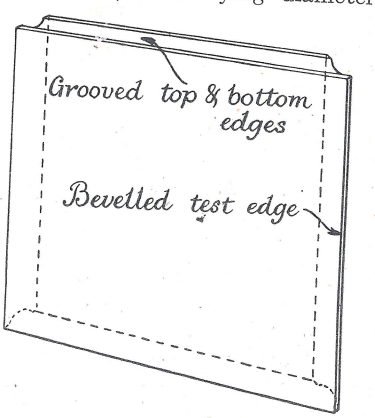
To save the inconvenience of fixing the discs to the lathe face plate, I resorted to a dodge which may be of interest. The lathe nose is screwed $\frac{7}{8}$" and I managed to pick up three $\frac{7}{8}$" Whit. nuts. These, of course, fitted the mandrel nose, and the discs were fixed to the face of the nuts by means of six $\frac{3}{16}$" C.S. Steel screws. Another way, and one that I prefer, is to get two or three Standard $\frac{1}{2}$" mild steel steam flanges (about 1/6d. each), fix to face plate, boss side out, take out gas thread and bore and screw to $\frac{7}{8}$" or size of mandrel. Screw to mandrel, take a cut across to true up, and drill four C.S. holes for wood disc. This is a good tip in cases where a chuck back is wanted urgently, as these flanges are usually to be obtained quite easily.

The emery disc, in addition to its polishing effect, is invaluable for its assistance in trueing up work. Take, for instance, a job such as a pair of links with rounded ends, or a connecting rod. To file a round end accurately is no easy matter, although "L.B.S.C's." tip of making a dummy guide for filing (see early notes on "Dyak") is a great help, especially as the final filing should be round the ends and not *across* them. Take out the tool post or bolt for holding lathe tool on rest, run the saddle up to the emery disc as near as possible without actually touching, and, lying the job flat, work the surfaces to be trued against the disc until the desired shape is obtained. I will guarantee that the edges will be dead square, and that is more than I can do if a file be used. Try it, experiment till all the resources of the gadget are exhausted, and I feel sure that one day you will bless the MODEL ENGINEER and our worthy "Super," through whose courtesy this article appears, to help brother M.E.'s to win that praise for a nicely finished model, which is mostly the only reward for hours of patient toil.

Any brother M.E. who wishes further information will get immediate attention if they care to write c/o the Editor.

An Accurate Square.

To produce a first-class square is fundamentally simple. The block square shown, made to a suitable size, should be a great asset to model mechanics, and however crudely produced, will indicate, by reversal on a surface plate, its own errors, which can gradually be eliminated. As a means of test, a turned parallel roller may be used, standing on the faced end, the quality of the square being dependent on the unvarying diameter along



the roller. If without a lathe or a means of checking the "parallelism" of the roller, another method is to produce two squares together, so checking, by reversal one against the other, not ignoring the squareness of the faces, apart from edges. To those who have acquired the art of lapping on a cast iron plate, the production of a hardened block square, having an extremely fine limit of accuracy, is mainly a matter of patience.

H.R.D.

Modified Steam Pump Valve Gears.

By H. R. LANGMAN.

THE following deals with some changes effected in the arrangement of the valve gears of two types of steam pumps of foreign origin.

The pumps had to function under anything but favourable conditions, often being submerged in water carrying a large amount of grit, which naturally played havoc with the working parts. But, worse of all, through the machines being normally in the hands of people not mechanically minded, when the pumps temporarily ceased working, the valve boxes and crossheads invariably received a "crack" from a heavy hammer. It had been discovered by this practice that a sticky valve might be restarted; the second practice had the effect of moving the valve gear slightly, when the pump occasionally commenced working.

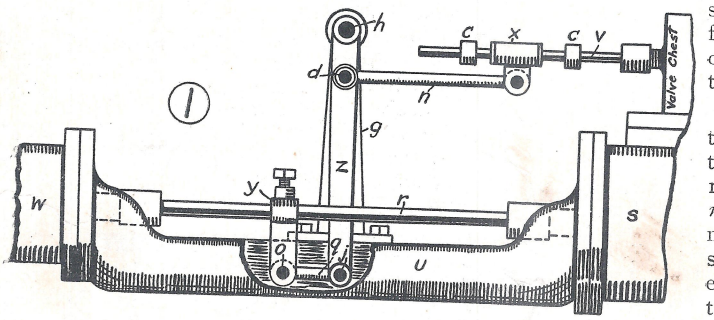


Fig. 1. Valve Gear as originally fitted.

Fig. 1 shows the esential portions of the pump to render clear the mechanical details of the original gear.

A substantial distance piece *u* separates the steam and pump barrel *s* and *w* respectively. Attached to the piston-rod *r* is a crosshead *y* carrying a pin *o*; a short link *q* jointed to the latter imparts motion to a pin *j* carried at the lower end of a pendulum lever *z*. This lever has for its fulcrum a pin *h* secured to a pedestal *g* bolted to the pump casting. A second pin *d* situated a little distance below *h*, through the medium of a link *n*, imparts a to and fro movement to the slider *x* on the valve rod *v*.

It will be seen that through the intervention of the lever *z* the movement of *x* is a reduced copy of the rod *r*. Usually a certain amount of play is given to the slider before engaging the collars *c* secured to the valve rod *v*, thereby providing a convenient means of gauging the stroke of the pump.

In one instance, on account of small clearance between the bottom of the vibrating lever *z* and the pump casing, there was a tendency for stones, etc., to stop the pump.

Again, when the holes in *q* became badly worn, there was a tendency for the latter to strike the pump casing. With the idea of obviating these defects, the elements of the valve gear were rearranged, as shown in Fig. 2.

The vibrating lever *a* is much shorter than formerly; but is fulcrumed on the same pin *h* and connected to the slider *b* as in the original gear.

It will be seen, however, that the crosshead *y* is turned round, the forked end being now uppermost and connected to the pin *n* is the lever *a* through the medium of a slotted link *e*. The slot need not be very long; from experiment, it was found that the link should be slightly curved if the distance from centre of crosshead pin and piston rod is small.

In service, the idea proved satisfactory, and after twelve months' hard work it was found only necessary to renew the slotted link, which was not hardened when first introduced.

Considerable trouble was experienced with the pendulum lever of a certain make of pump where the lever was a brass casting, the lower end being forked to engage a roller mounted on a pin carried by the crosshead. The forked end became quickly worn, and considerable hammering took place. On account of the levers requiring frequent attention, a steel lever of the type shown in Fig. 3 was substituted.

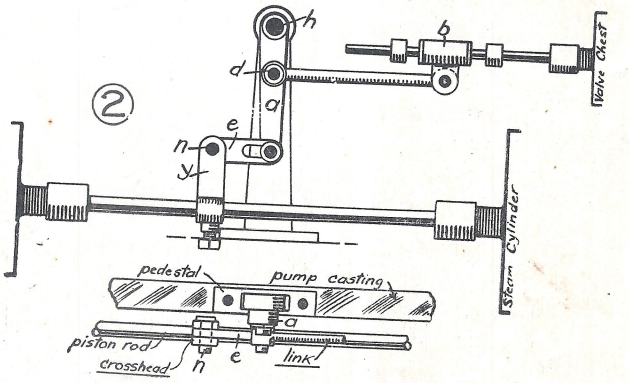


Fig. 2. Rearrangement of Elements of Valve Gear.

A piece of steel bar forms the basis of the lever; at one end is drilled a large hole to

receive the brass bush *b* whereby the whole is supported from a pin anchored to the pedestal *g* (Fig. 1). The bush is retained in position by two small screws *h* inserted through the flange of the bush. A second and smaller hole receives the pin *y*, to which is jointed a link imparting motion to the valve rod. The lower end of the lever is slotted to suit the roller *r*.

It will be fitting to conclude these notes with a few particulars of a built-up pendulum lever the writer found fitted to a large pump, and which apparently had done duty for a long period; the lever was ultimately replaced by a steel forging.

Turning to Fig. 4, the "U" shaped steel member *x* has cast in its arch a block of whitemetal *w*, in which are positioned two brass bushes *b* and *d*, the large bush *b* oscillating on the fulcrum pin, whilst the lower bush carries a pin actuating the valve link.

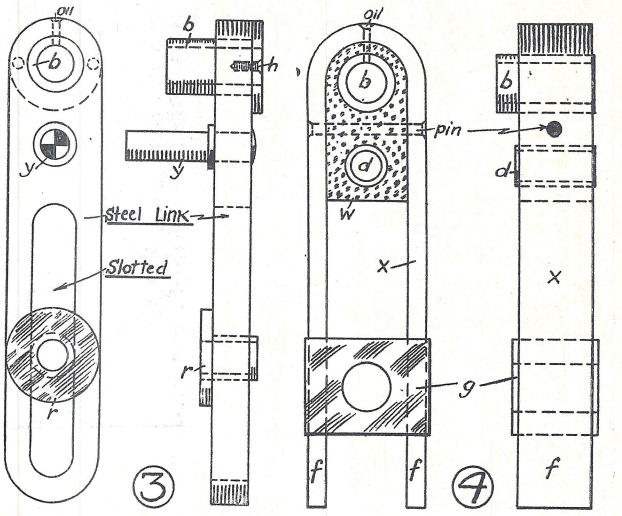


Fig. 3. Modified Pendulum Lever. **Fig. 4. Built-up Pendulum Lever.**

The lower portions of the steel strap *f* are parallel, and serve as guides for the slipper block *g* attached to the crosshead.

MODEL MARINE NOTES

In the Wake of the Power Boats.

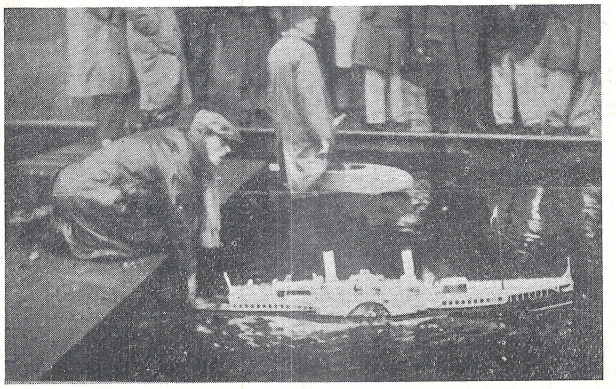
By THE SPECTATOR.

The M.P.B.A. Grand Regatta closes the 1935 Season.

Sunday, September 29th, was the date of the Grand Regatta, the lateness of the event being due to the later "Model Engineer" Exhibition.

While the actual day dawned dry, by nine o'clock the rain was teeming down, and it continued until well after two in the afternoon, its only variation being in its intensity . . . . raining very hard, torrential downpour, and cloud-burst!

In spite of the weather, there was quite a good turnout of boats and spectators; everyone was in excellent spirits and treated the weather as rather a joke. Let those laggards who preferred to stay at home remember, to their shame the stalwarts from Southampton, Altrincham, Kettering, Oxford and other distant places who spent the morning in helping to make the day a success.



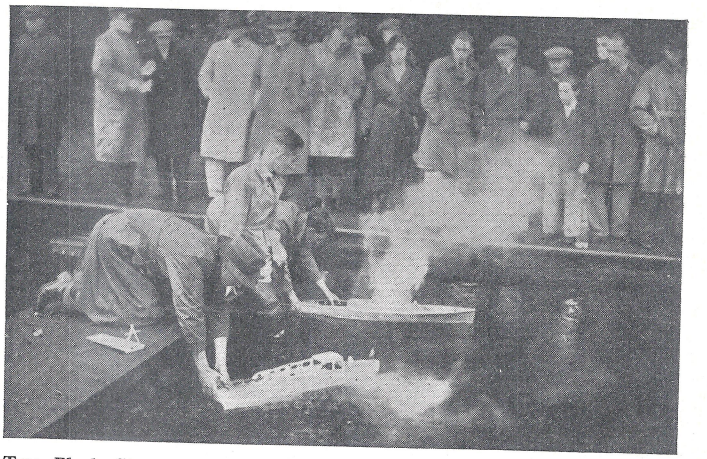
Mr. Eltridge, of the V.M.S.C., starting his Model Paddle Steamer "Royal Sovereign" in the 100 yards Straight Race.

First event on the programme was the hundred yards straight race for class B and class C boats. This event produced some fine runs, though the rain did not help those petrol-engined boats with uncovered high tension leads, while an occasional gust of wind shifted a boat completely off its course. First place in class B went to Mr. Vine's "Silver Jubilee," while the veteran "Nippy" filled second place. In class C, Mr. Curtis was first, Mr. Thomas of Swindon being second.

The next event, the steering competition, showed some very straight running, Mr. Eastaugh's "Tony," of the West London Club, winning with the high score of thirteen points out of a possible fifteen. Mr. Vines was second and Mr. Vanner third.

The prototype competition, which was held in conjunction with the steering, was also won by Mr. Eastaugh, thereby proving that it is possible to make a boat look well, at the same time give a performance in keeping with its appearance. Second place went to Mr. Morse, of the Victoria Club. One of the rules of this event is that once a boat has won an award, it is no longer eligible for the same event in following years.

During the interval, it was suggested that the weather had brought out so many different garbs intended to keep their owners dry, that a fancy dress competition might be held. This suggestion had the warm support of Mr. French, who would have started with undoubted advantages in that line.



Two Flash Steam Cruisers, from Southampton and Swindon respectively, starting up for the 100 yards straight race.

Before the interval was over, the rain had stopped, and within half-an-hour, the sun was out—an excellent example of the traditional English summer!

The last event on the programme was the thousand yards race for circular course boats. Actually, this race combined to give the results for four events.

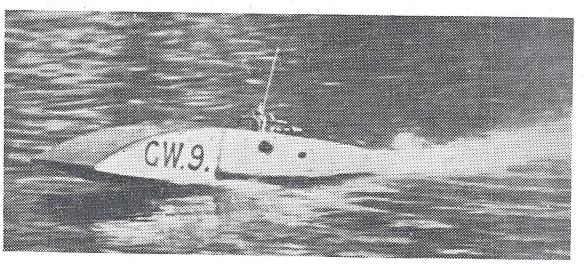


Photo by [*L. J. French.*

"Oigh Alba" running in the 1,000 yards race for the "Mears" Trophy.

No records were broken, but the standard of running was higher than previously attained during this season. The boats had little trouble in getting away, and with one or two exceptions, completed the course. A welcome entrant for this event was Mr. Rankine of the Glasgow Club, with his boat "Oigh Alba II" which, however, did not show its usual speed. Mr. Cockman's "Ifit IV" gave as fine a run as we have seen from a flash-steamer in quite a long while. "Miss Swindon II," a boat new to London, showed that Swindon is interested in speed. After the big boats had finished their runs, two of the baby class flash-steamers from Southampton, and a 15cc. hydro from Swindon showed what they could do. It seems rather a pity that there was no event for the smaller class of racing boats at this regatta; had there been, there would have been at least three more entrants, which would have made a total of six. This small class is going to be popular next year.

The winner of the "Mears" Challenge Trophy was Messrs. Innocents' "Betty," second "Oigh Alba II" and third Mr. Clifford's "Crackers" The Wembley Trophy for the fastest boat in the race which had been built since the last Grand Regatta and had not attained an award in any inter-club race, was won by Mr. Wraith, of Altrincham, and the Crebbin Trophy, for flash-steamers, timed over the first five hundred yards of the course, went to "Ifit IV."

The nomination competition for ladies was won by Mrs. Vanner, who gave a time only 2/5 seconds out. Miss Smith, of Swindon, was second.

The prizes were presented by Mr. Crebbin, who was an interested onlooker during the entire day.

And so another regatta season comes to a close; while we have seen records broken, there has been a general falling off in the attendance at regattas, and the standard of reliability is not so good as last year. It is to be hoped that the winter will give builders a chance to build new boats and tune up in general, so that 1936 may show two years' improvement, to make up for 1935.

Photo by [*L. J. French.*

The Swindon Club's entry for the "Mears" Trophy Race.

QUERIES and REPLIES

Querists must comply with the Conditions and Rules given with the Query Coupon in the Advertisement Page of each issue.

6,756.—Making a Thermostat.—G.C.N. (Birmingham).

Q.—I want to make a heat operated control device, preferably in the form of a flat coil with an outside dia. not exceeding 2 inches.

It would have to operate in a temperature of round about 350 degrees F.

The principle I'm aiming at is that the coil should expand and contract according to the rise or fall of the temperature.

What would be the most suitable metal from which to make up such a coil? I want as much movement as possible. If of round section, I could use 3/16 in. dia. metal.

A.—In order to obtain appreciable movement from a metallic thermostat of the type quoted, it would be necessary to make the coil from two metals of widely different coefficients of expansion, attached closely together throughout their length, and disposed so that one metal forms the outside of the coil and the other the inside. By this method, the different expansions in the two metals will cause the curvature to increase or decrease very considerably. This principle is used extensively in such devices as electric flashing signs, etc., and in this case, sufficient movement is obtained to operate a switch contact by employing a straight bi-metal strip, which becomes curved when heated. The metals should be brazed together, and a flat section is the most convenient. It is largely a matter of expediency what metals are employed; whereas platinum and silver have large differences of expansion, they are often too expensive for common use, and quite good results may be obtained using copper and iron. Brass has a slightly greater expansion than copper, and some iron alloys (steels) have very small expansion, so that the effect can be regulated within very wide limits by careful selection of the metals employed.

6,722.—Reducing the Speed of a Motor.—N.F.M. (Cheshunt).

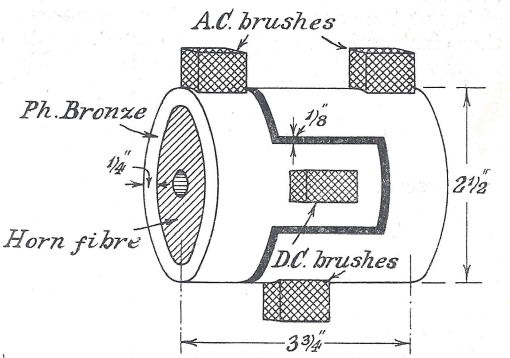
Q.—I have a motor of approximately ⅛ h.p. which runs at an excessive speed on my 250 volt 50 cycle A.C. mains, and sparks excessively at the brushes. If I load the motor slightly, it also blows the 10 ampere fuse. I have been trying it with the element of a 550 watt electric iron in series, and it then runs with very little sparking, but does not develop any appreciable power. It there any better form of resistance?

A.—You give no details of your motor, whether for instance it is a commutator type, and whether series or shunt wound, size of armature, etc., which makes it difficult to advise you definitely. From the fact that it races at an excessive speed, it is probably a motor of the ordinary commutator type, but unless it is series wound, it is of no use trying to run it on alternating current. Perhaps you can examine the field coils, and if they are wound with coarser wire than that on the armature, it is series wound; if on the other hand the field wire is smaller, it is shunt wound, and in that case suitable for direct current only. The excessive current it takes is probably due to the motor being wound for a much lower voltage than 250, in which case you would need to rewind entirely if you require the best performance from it, since running a low voltage motor on high voltage with a series resistance to reduce the pressure is never very satisfactory, as the voltage drop across the resistance varies with every change in the current when loaded, the voltage drop is considerable, leading to low speed and small power; unloaded, the pressure drop is negligible, so that the speed is excessive again. If it happens to be a shunt wound motor, it would take a tremendous current, as there is only the armature impedance to contend with. You should study some of the handbooks published by our book department dealing with small motors and dynamos.

6,682.—Details of Rectifying Commutator.—J.R.B. (Knighton).

Q.—Please give me details for constructing a commutator type rectifier to pass 70 volts 20 amperes, stating the required speed. What horsepower will be required to drive it?

A.—The sketch reproduced below (not to scale) shows the principal dimensions recommended. As will be seen, it consists of two



All brushes 7/8" x 5/8" "Link A" carbon.

similar tubular elements, slotted to interleave with one another and mounted on a horn fibre bush by radial screws. Air gaps about ⅛ in. wide (shown by a thick black line) are left between the two halves and the dimensions have been liberally proportioned, as the wear and tear is very heavy with this type of rectifier. The two A.C. brushes bear on the outer continuous portion of the phosphor bronze rings, the two other brushes for rectified current are spaced 90 degrees apart on the centre track where the connection automatically changes first to the right and then to the left in synchronism with the waves of alternating current. If

the circuit on which this is employed is of 50 cycle frequency, the commutator will require to be driven at a speed of 3,000 r.p.m. A motor of ⅛ h.p. should be large enough for driving purposes, as there is only brush and bearing friction to be overcome.

6,745,—Small Mixing Valves.—D.J.C. (Portland, Maine).

Q.—Recently I bought some petrol engine castings froma firm in England, together with blue print. I should like to know how to control the air in the mixing valve. My little experience in these valves is that provision is made in some way to regulate the air by shutter or other means. Is it possible to have the air opening the correct dimensions without a shutter and regulate the mixture by the needle valve alone?

A.—We think there is no control of the air supply provided, as the engine is intended to run flat out only, the mixture strength being adjusted by the petrol needle valve. This is quite satisfactory so far as it goes, but the provision of air regulation would assist control, and may be added if thought desirable. It is pointed out that this simple carburettor is not a mixing valve.

Some useful information on devices of this nature will be found in an article on "Simple Carburettors and their Limitations" in the issues of THE MODEL ENGINEER dated August 22nd and 29th, 1935.

PRACTICAL LETTERS from OUR READERS

Model Loco. Standards of Performance.

DEAR SIR,—The gentle art of allegory has been pressed into service to illustrate technical points on more than one occasion, so perhaps I may be forgiven for relating this little story:

A little boy was seen walking down the street one day with his hands extended rigidly out in front of him in a manner suggesting that he was afflicted with paralysis Entering a hardware shop, he approached the counter and announced "Muvver wants a saucepan lid—this size," indicating his extended hands. The assistant carefully explained that the measurement was not sufficiently accurate for him to select the right size lid, and told the boy to measure up the utensil with a piece of string, if no rule or tape measure was available, and to tie a knot in the string at the correct length. Having absorbed these instructions, the youth departed, to return in a few minutes with his improvised measure. But to the assistant's complete discomfiture he explained that, as he could find no string, he had used a piece of elastic!

I have followed for a very long time now the various discussions on model locomotive performance, and am struck by the fact that, although definite and even quite dogmatic statements are made in support of the contentions of the writers, their standards of performance are about as definite as the small boy's elastic gauge.

The final court of appeal in the model loco world is, apparently, how much weight can be hauled on a level track; but surely this figure cannot be taken as a reliable standard, since so many factors influence it in very large measure; the friction of rolling stock, condition of the track, and available adhesive weight are, perhaps, the most important, but there are other subtle influences which combine to prevent it from being anything like constant.

It seems to me that, given axle bearings of sufficiently careful design and workmanship, with a view to avoidance of friction, unlimited adhesive weight, and valves correctly adjusted and steam-tight, pistons ditto, there is no limit to hauling capacity! Tell me, model loco experts, is there a fatal flaw in my reasoning, and if so, where?

I note that most of the locomotive fraternity do not seem to like the idea of brake testing, and I have a suspicion that this may be because it would give too many facts away. Whatever may be said against a brake test (properly conducted, of course) it would at least give a true measurement of the actual power which can be exerted and *maintained* by a model locomotive. We might then, without wasting quite so much valuable space in the "M.E.," be able to form some opinion as to whether it is really an advantage to make cylinders nearly as big as the boiler, or whether the "X" valve gear is just as good as the "Y." Until the loco experts can dispense with their rubber foot rule, no real truths will emerge.

Yours faithfully.

London. "B.H.P."

Where does the Energy Go?

DEAR SIR,—A few weeks ago one of your correspondents put forward the interesting problem of the apparent contradiction of the Law of the Conservation of Energy by the rusting away of a wound-up spring.

The idea that the latent energy of the spring dissipates in the form of heat during the rusting, or oxidation, of the metal is, I think, very wide of the mark, since such heat obviously is that of chemical combination ($4Fe + 3O_2 = 2Fe_2O_3$ + heat).

My own theory is as follows: If you examine rust you will find it in strata. I contend that the energy of the spring went in the "snapping" of minute strata of rust; it is not difficult to imagine the sub-division, by super-human agency, of a wound-up spring into infinitesimally small portions, and the "unwinding" of these, leaving a compact mass of "unwound" bits no larger than the original spring. In other words, the spring unwound itself by the "fly-back" of tiny fragments of itself, incidentally giving up its energy in the form in which it received it—kinetic.

This theory could be proved in an interesting way. Arrange for a strong container to contain, a tight fit, a tightly-wound spring. Introduce into a calorimeter and, in an atmosphere of pure oxygen, electrically raise the

temperature of the spring to whiteness. Partial oxidation of the spring to magnetic oxide of iron will take place, and the absence of discrepancy between the calculated and observed evolution of heat will confirm the above theory.

Now here are two interesting problems arising out of the above. The answers are simple, but I will not give them unless asked. (1) A tightly-coiled spring is heated to whiteness in a vacuum (to avoid oxidation), and the temper of the spring thus spoiled. After this treatment, the spring has little "kick" left. Where did the lost "kick" go? (2) A fully-wound spring of inferior quality is left undisturbed for a long period. Afterwards, though no rusting occurred, loss of energy was observed. (Owing, of course, to the spring "staying put.") Where did the energy go?

Yours faithfully,

Notts. J. A. SEARS.

Feed Water for Model Locomotives.

DEAR SIR,—I am extremely thankful to Mr. Martin for that measure of assistance which he has given me in recommending "Fitz" boiler fluid for scale removing, where there is already scale formation.

Connecting Mr. Burgoyne's request in your issue of August the 15th, it is opportune to draw his attention to Mr. Martin's recommendation contained in your issue of June, the 27th.

Incidentally, Mr. Burgoyne's remark to the effect that his boiler is never empty, raises the controversy as to the policy to adopt in the interests of avoiding pitting. On my railway, the chief mechanical engineer is emphatic that water should be drained from any boiler likely to remain idle for more than a few days, in order to avoid excessive pitting, which has been found to result from remaining idle for period of a fortnight or more, after having been filled up with water. It seems then that the model boiler of steel manufacture should not be an exception.

There are, however, other schools of thought, no doubt, and I am sure both Mr. Burgoyne and the undersigned would be glad to hear what others have to say.

Yours faithfully,

R. HORSFIELD.

Bombay Presidency, India.

American Model Locomotives.

DEAR SIR,—I should be pleased to know if any of the readers of "The Model Engineer" have made a model of the B. and O. "President Washington" locomotive. I have one well in hand, and should like to get in touch with any reader who has made one or is constructing one.

Yours faithfully,

Stalybridge. B. H. WAINWRIGHT.

Institutions and Societies.

The Society of Model and Experimental Engineers.

Meetings. At Caxton Hall, Westminster, at 7.0 p.m.

Thursday, October 31st. Lecture by Mr. L. M. G. Ferreira, M.Inst.C.E., on Injectors and Ejectors. Mr. Ferreira is well known as the maker of very efficient working model injectors. Come and hear what he has to say on the matter. Would-be visitors may obtain a card of admission from the Secretary.

Tuesday, November 19th. Nomination Night and Competition, Track and Model Night.

Workshop. Demonstration by Colonel Marchment on the Practical Use of Gauge Blocks on Friday, November 1st. Rummage Sale on Monday, November 4th.

Secretary: R. W. WRIGHT, 202, Lavender Hill, Enfield, Middlesex.

Finchley Model Engineers' Society.

On October 2nd, the Society met for the first time at their new meeting rooms at Avenue House, Finchley. There will be an opening night on November 27th, with a whist drive; other meetings until then will mostly be devoted to erecting a test track, fitting a workshop, etc.

We are very pleased to report that out of seven entries in the "Model Engineer" Exhibition Competition, our members obtained the first "Model Railway News" prize, a bronze medal, and four diplomas. Among the models on the Society's stand were a G.W. 4-2-2, "Lorna Doone," and a G.W. 0-6-0 goods, by Mr. J. N. Maskelyne, both under construction. On the Society of Model and Experimental Engineers' track, locos. belonging to Mr. Crebbin, Dr. Robinson, Mr. Randall, and Mr. W. G. Smith were to be seen running.

There will be an exhibition organised by the Society at the "Arcadia," Church End, Finchley, N.3; further particulars will be published after the special meeting of October 30th. The dates have already been fixed, and they are from January 15th to January 18th inclusive.

Future fixtures are: October 23rd, Open Night; a Rummage Sale. October 30th, a Special Meeting. November 6th, Track Night. All the above fixtures will be held at Avenue House (2nd Floor), East End Road, Church End, Finchley, N.3.

A visit has also been arranged on Saturday, October 26th, to Nine Elms Locomotive Works, S.R.

Further particulars from the Hon. Sec., S. C. PRITCHARD, "Bishopswood," The Bishops Avenue, East Finchley, N.2.

Croydon Society of Model Engineers.

Our next meeting is a Discussion Night, and will be held on October 21st, at 8 p.m., at Clyde Hall, Clyde Road, Addiscombe.

Hon. Sec., H. W. CLEMENTS, "Olivedene," Coulsdon Road, Old Couldsdon.

The Aylesbury Gang.

Arrangements have been made to have running under steam the beam engine at Ashridge Pumping Station on Saturday, October 19th. This will probably be the last time the engine will be run before being dismantled. The Gang will be pleased to welcome any readers who may be interested. The party will meet at the Bridgewater Arms, Ashridge, near Tring, at 2.30 p.m.

All communications should be addressed to H. D. BOND, Park Square, Luton.

The City of Bradford Model Engineers Society.

The above Society held the first meeting of the winter session on Thursday evening, October 3rd, at Messrs. Mitchell's Cafe, Godwin Street.

There was a good attendance and a very good show of models; the following items were much appreciated, and brought about a discussion on locomotive construction: Mr. Fornsworth's Gauge "O" French "Pacific" loco. and tender, which is near completion; Mr. F. Kellett's "Princess Royal" 2½ in. gauge chassis; Mr. K. Harrison, parts and fittings for his "OO" gauge American loco., and Mr. Wright Gledhill, a finished model L.B.S.C.R. "Atlantic" type 2½ gauge loco. and tender. Mr. Gledhill has promised to have the above under steam as soon as we can get the proposed track ready.

A visit has been arranged for October 26th to Messrs. Hailwood and Ackroyd, Ltd., Morley, nr. Leeds, specialists in glassware.

Full particulars and a copy of the rules for the above Society can be obtained from: AMOS BARBER, 15, Hartington Terrace, Lidget Green, Bradford.

Manchester Society of Model and Experimental Engineers.

The next meeting of the above Society will be on Friday, October 18th, 1935, at 8 o'clock, at the Manchester Schools of Technology, Sackville Street, Manchester. New session starting.

Hon. Sec. and Treas., W. E. WOOD, 20, Albert Place, Longsight, Manchester, 13.

The Altrincham Model Power Boat Club.

The above Club will hold its next meeting on October 21st, in the Scouts' Headquarters, Sandy Lane, Stretford, at 8 p.m.

Hon. Sec., F. W. WATERTON, 3, Grosvenor Square, Ashton-on-Mersey.

Leicester Society of Model Engineers.

The next meeting of the above Society will be held on Friday, October 18th, at 8 p.m., at St. Mary's Schools, Castle Street.

At the last meeting, it was decided to hold our next exhibition during the last week in February, 1936, at St. Mary's Schools.

Hon. Sec., J. WALKER, 78, Waltham Avenue, Braunstone Estate, Leicester.

The Kent Model Engineering Society.

On Friday, October 25th, at 8 p.m., the next meeting of the above Society will be held; this will be a surprise night, and takes place at the Club's headquarters, Sportsbank Hall, Sportsbank Street, Catford, S.E.6.

Six new members joined the Club as a result of the Society's stand at the "Model Engineer" Exhibition. In the past, the locomotive section of the Society has been in the majority, but now the power boat men and stationary engine section bids fair to outnumber them.

We are endeavouring to form a model flying section, and shall be pleased to welcome anyone interested. A varied and interesting programme for the coming winter has been arranged and model engineers of Kent could not do better than join up with a real live Society like the Kent Model Engineering Society.

Hon. Secretary, W. R. COOK, 38, Shorndean Street, S.E.6.

The Junior Institution of Engineers.

Friday, October 18th, 1935. At 39, Victoria Street, S.W.1, at 7.30 p.m. Informal meeting. Lecture, "The Thames Barrage," by J. H. O. Bunge, M.I.Mech.E. Slides.

Friday, October 25th, 1935. At 39, Victoria Street, S.W.1, at 7.30 p.m. Informal meeting. Lecture, "Luminous Discharge Tubes," by C. C. Paterson, O.B.E., M.I.E.E., M.Inst.C.E. (President).

Notices.

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Matter intended for publication should be clearly written on one side of the paper only, and should invariably bear the sender's name and address. Unless remuneration is specially asked for, it will be assumed that the contribution is offered in the general interest. All MSS. should be accompanied by a stamped envelope addressed for return in the event of rejection. Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All subscriptions and correspondence relating to sales of the paper and books to be addressed to Percival Marshall and Co., Ltd., 13-16, Fisher Street, London, W.C.1. Annual Subscription, £1 1s. 8d., post free, to all parts of the world. Half-yearly bound volumes, 11s. 9d., post free.

All correspondence relating to Advertisements and deposits to be addressed to THE ADVERTISEMENT MANAGER, "The Model Engineer," 13-16, Fisher Street, W.C.1.

Contents.

The asterisk (*) denotes that the subject is illustrated.

SALES AND WANTS

EVERYBODY'S MARKET for ENGINEERING & SCIENTIFIC ELECTRICAL GOODS

Advertisements are inserted in these columns at the rate of **One Penny** *per word; minimum charge for advertisement,* **One Shilling.** *Single letters or figures are charged as words, and a compound word as two words. The advertiser's name and address are charged for.*

Advertisers who wish to separate *their announcements into distinct paragraphs must have not less than 20 words in any one paragraph followed by the word "Below"—which is charged for.*

"Box" replies, *care of these offices, are charged 6d. extra to cover postages. The following words must appear at end of advertisement: "Box——, 'Model Engineer' Offices," for which usual rate will be charged. (Advertisers need not include our full address.)* **When replying to a "Box No." advt.** *address your envelope: Advertiser, Box——, "The Model Engineer," 13-16, Fisher Street, London, W.C.1.*

All advertisements in these columns must be prepaid, *and remittances should be made by Postal Orders or Stamps, and sent to the Advertisement Manager, "The Model Engineer," 13-16, Fisher Street, London, W.C.1.*

Please state under which Classified Heading you wish your advertisement to appear; the classifications are as follows:—

General, Models, Wireless, Motoring, Tools, Engines, Electrical, Business, Wanted.

Advertisers are requested to send in their announcements as early in the week as possible, as although we accept advertisements up till the first post on Friday preceding the date of issue, **we cannot guarantee the insertion of those arriving on this day.** *Telephone: Holb.: 3818-3819.*

OUR DEPOSIT SYSTEM.

We will receive from intending purchasers the purchase money of any article advertised or sold by our advertisers, and will acknowledge its receipt to both the Depositor and the Vendor, whose full names and addresses must be given. Unless otherwise arranged beforehand between the parties, it is understood that all goods are sent on approval, and that each person pays carriage one way if the goods are returned. The deposit is retained by us until we are advised of the completion of the purchase, or of the articles having been returned and accepted. In addition to the amount of the deposit, a fee of 1/- for the sum of £1 and under, and 1/6 for amounts in excess of £1, to cover postage, etc., must be remitted at the same time, and sent to the Advertisement Manager, "The Model Engineer," 13-16, Fisher Street, London, W.C.1. In cases of persons not resident within the United Kingdom, double fees are charged.

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In cases of exchange, money to the value of the article should be deposited by each party. **We cannot receive the articles themselves.**

General

Watch Repairers. Send 3d. for list of Tools, Materials, Watches, Clocks, Gramophone Parts. Guaranteed watch repairs. Complete clock movements stocked. Parcels fully insured.—BLAKISTON, Ainsdale, Lancs.

Cheap Printing. 1,000 Billheads, 3s. 6d. Samples free.—CRETEWAY PRESS (22), Buxted, Sussex.

"Eureka" Improved Air Compressors for paint spraying, inflating Tyres, etc., pressures up to 120 lbs. sq. in.; No. 2 model, 55s.; No. 3 model, 50s.; Drawings and castings, No. 2, 10s. 6d.; No. 3, 12s. 6d.; photo. 3d.—POYSER, Peck's Hill, Mansfield.

Case-Hardening and Heat Treatment. Send your inquiries to. — KASENIT, LTD., the recognised specialists, Henry Street, Bermondsey, S.E.1.

Small Turned Screws, Nuts and Washers. Assorted gross B.A., brass 2s., steel 2s. 6d. Whitworth, brass, 3s., steel, 2s. 6d. List and samples, 2d. Trade supplied.—J. H. BENNETT, Station Road, Willesden Junction, N.W.10.

Ball Bearing Plummer Blocks, 1", 5s.; ¾", 4s. 3d.; ½", 2s. 6d. Shafting, Hangers, Pulleys, Cones, Complete Countershafts from 10s.—HALL'S, 30, Colindale, Erith.

M.E Hexagon Screws, Nuts and Washers, lowest prices, gross lots, large assortment of other sizes. — ALLNUTT & Co., Lee Chapel Lane, Langdon Hills, Essex.

Bargains! Air Compressors, new, 30s. Super Spray Guns, 18s. 9d. — JOHN M. E. STEEL, Bingley.

For Carnival Novelties, Decorations, Flags, Balloons, Streamers, Hats, etc., go to V. O. GINN AND Co., 16, Red Lion Square, High Holborn, W.C.1 (close to Kingsway). List free. Chancery 7654.

"Machine Shop Companion." Splendid book, 100 illustrations, post free 2s. 3d. (abroad 2s. 6d.). — BENTLEY'S PUBLISHING COMPANY (Dept. M.E.), Halifax, Yorks.

Engrave on Metals with the Vibrita Engraving Machine, tallies, name plates, etc., speedily done. A.C. mains only. £3 complete. Particulars. — LYCETT'S, Skinnergate, Darlington.

50 Watch Movements, 8s. 6d.; also Splendid Set of Watch Maker's Tools and Materials, 30s.—SHERLIKER, 17, Balfour Road, Preston.

A Money-Making Agency offered, spare time, 20s. weekly easily earned.—Apply, 41 Desk, RICHFORDS, LTD., 9, Snow Hill, London.

Super Quality Free-cutting B.D.S. in approx. 1 ft. Lengths. Rounds, Squares, Hexagons, up to ⅝" diameter, price 2s. per 7 lb. parcel, post paid. Also in Brass Rounds up to ⅝" diameter, including several sizes, Squares and Hexagons, price 2s. 9d. per 7 lb. parcel, post paid.—PREMIER SCREW AND REPETITION Co., LTD., Highcross Street, Leicester.

"Model Engineer," seven bound volumes, brand new, never been used, from 1931 consecutive, 35s. — Box 891, MODEL ENGINEER Offices.

Casting Mould for Accumulator Plates, and booklet "Accumulator Making," 6s. 6d. Sample Plate and booklet, 1s. 4d.—INDUSTRIES, 13, Gordon Avenue, Twickenham.

Shock Proof Wrist Watches, square shape, chrome case, very reliable movement, silvered, or black luminous dial, complete on strap, 8s. 6d.—B.M.O. Co., Hill Road, Swanage.

Keith-Blackman Rotary Compressor, 200 cube feet per hour to 5 lbs. pressure, nearly new, £7. — BLAKENEY, 11, The Crescent, London, N.W.2.

Disposal of Private Workshop. All perfect goods; ⅓ H.P. D.C. Motor, 220, 7s. 6d.; 2½" Portass Lathe with foot motor, tools, etc., 30s.; H.M.V. Gramophone and Records, £2; Stuart Vertical Steam 1½" × 1½", £3; "Brown" Loud Speaker, 5s.; 15 c.c. Aero, complete, new, £3; ⅓ H.P. D.C. Motors, need adjusting, 4 for 10s.; 1½" Bore Twin Steam Boat Engine, parts missing, 5s.; 1 H.P. Two-Stroke, W.C. Stationary Engine, complete plant, £4 10s.; Lucas 10v. 10a. Dynamo, 10s.; Undertype, ditto, 6v. 4a., 5s.; Hornby "O" Gauge Railway (£15), £5; S.H. "Morgan" Back Wheel Races, Brake Band and Sliding Axles and Tubes, etc., 15s. lot; 4 Cylinder Magneto, 5s. All above new or nearly so, except where otherwise stated, and all perfect condition; postage extra. Stamped envelope please if you want a reply, or call after 6.—"WORKSHOP," 80, Ridgeview Road, Whetstone, N.20.

Bargains! 5 Only, 12 Volt, 10 Amp. Ball Bearing Dynamos, perfect, 7s. each; 3 Only, New 10" Bandsaws, 40s. each; 12 Only, Ball Bearing Grinding Heads, new, 4s. 6d. each; New £3 15s. Electric Drills, 50s. each; 1 Only, New, Soiled, 6" Saw Bench, 27s. 6d.; 110 Volt D.C. Paint Spray Plant, 55s.; ½" Power Bench Drill, 22s. 6d.; ½" Electric ditto, new, 60s.; 10 ¼ h.p. 200-250 Volt D.C. Motors, 18s. 6d. each; 3" Precision. B.G.S.C. Lathes, new, worth £10 10s.. £6 7s. 6d. each.—JOHN M. E. STEEL, Clyde St. Mills, Bingley.

Steam Car Developments and Steam Aviation. A monthly magazine, price 9d., Modern Steam and its Application. Published by R. H. and H. W. BOLSOVER, Castle Road, Whitby.

Turned Brass Screws, B.A. Sizes, Gross Assorted with Nuts and Washers, 1s. 9d. post free. — MICROCO, Precision Engineers, 26/31, Eyre Street Hill, Hatton Garden, E.C.1.

"Model Engineers," 1929 to 1934 inclusive, 10s. carriage forward. Wanted, "O" Gauge 20 Volt A.C. Loco. or Mechanism.—44, Greenend Road, Moseley, Birmingham, 13.

Express World Delivery. 10,000 Parcels containing "Ornamental Turning," Evans (3 vols.); "Simple Decorative Lathe Work," "Possibilities Small Lathes," "Turning," Lukin; 12s. parcel, posted.—ALBERT FEATHER, Bookseller, White Abbey, Bradford, Yorkshire, England.

"Model Engineering." By Henry Greenly, A.I.L.E. With working drawings of Engines, Boilers, Rolling Stock, Cannon, Electric Machines, etc., 85 photographs and 724 line drawings. Price 9s. 3d., post free.—PERCIVAL MARSHALL & Co., LTD., 13-16, Fisher Street, London, W.C.1.

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Electric Home Cinemas, standard films cheap. Lists. — WAYLAND, 109, Kenlor, Tooting, London.

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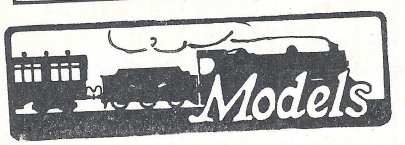
Films, 100 ft., 35 m.m., Comical or Cowboys, 9d., post 4d. Cinematograph (9.5 mm.), 12s. 11d.—ROBT. HOBBS, 20, Mansebrae, Glasgow, South 4.

"Home Cinematographs." Early Model Pathé 12v. motor with rewind, and 80 Super Films, 28 mm., in good order, £8 10s., cost over £70; Pathé 9 mm., 12v. motor and 3 Super Films, £3 10s., original cost £12; Camera, 9 mm., 30s.; ½ inch Scale Model Locomotive, G.W. "000" broad gauge, engineer made, £3 10s.; also 5 ft. Yacht, S.V. engine, tubular boiler, £3; "Victoria and Albert Model," both want restoring, about 50 years old; Butcher's "Home Standard" with Films, £3 10s.. cost £16; Lecturer's Cinematograph, with 250 motor and resistances, complete in travelling case, about 12,000 ft. of films, "Standard," cost £75, offered for £13 10s., nearly new condition. No correspondence; callers only.—H. E. FUGILL, 86, Old Church Road, Clevedon, Somerset.



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Boilers in Steel or Copper, all types and sizes. Locomotives Boilers from ½" scale made to fit your frames, flanged plates, supplied copper or steel. — GOODHAND, Marlborough Road, Gillingham, Kent.

Sale or Exchange Workshop Contents. New 3½" Drummond Bench Lathe with chucks, Planer, automatic feed, High Speed Drilling Machine, Motor Shafting, etc. Wanted, First Class 1" or ¾" Scale Coal Fired Loco. "Pacific" type. Full particulars on application.—Box 890, MODEL ENGINEER Offices.

15 c.c. Model Speed Boat, 30", super, light, strong aero construction, original design, Grayspec engine, brand new, parallel drive, potential class record breaker, owner going abroad. Offers?—LONGMORE, R.A.F. College, Cranwell, Lincs.

Quantity of Loco. Parts, all finished, Feed Pump, Boiler Fittings, Castings, all engineer made, going for a song.—39, Gubyon Avenue, Herne Hill, London.

Passenger Hauling Locomotives in all gauges from 1½" to 5". We specialise in large scale rolling stock. Price list, 3d.—"EJAYCEE" MODELS, E. J. COOKE, 66a, George Street, Hastings.

Two ½" Scale Locos., perfect running order, nearly finished; ¾" Scale Coal Fired Boiler with fittings, engineer built; Stuart ¾" × ¾" Horizontal; Bassett-Lowke's No. 2 Babcock Boiler and Engine complete on stand.—45, Elms Lane, Sudbury, Wembley.

Castings and Drawings for L.M.S. "Pacific," "The Princess Royal," and Southern Railway "Schools" class, 4-4-0, 3 cyl. Both 3½" gauge. These make up into close copies of originals. Also castings for 2½" and Gauge 1. Stamp.—H. P. JACKSON, 90, Holgate Road, York.

Powerful Traction Engine, 1½" scale, Blue Prints, Castings, Boiler and All Materials, Machined Parts. List 1½d.—Below.

Horizontal Engine, Drawings, Castings, Materials. List free. 2½" Gauge Castings, suit L.B.S.C. Locos.; Hornplates, 4d.; Boxes, 4d.; Tender Horns, 6d.; Boxes, 3½d.; Brake Blocks, 9d. set.—A. J. EVERY, Engineer, Mill Lane, Shoreham-by-Sea.

Aero Engines, 15 c.c., new, complete, with propeller, carburettor, plug, contact breaker, light alloy, best made, £3 each, limited stock. Ditto Marine, with flywheel. Stamped envelope, appointment.—80, Ridgeview Road, N.20.

Note! The response to our recent advertising has been excellent, and we thank readers for their valued orders. To those who have not yet had a set, may we remind you that we offer you Sets of Castings, in light alloy, at the following attractive prices (postage paid): 15 c.c. Petrol Engine Set, 15s.; 15 c.c. Float Feed Carb. Set, 4s.; 30 c.c. Float Feed Carb. Set, 4s.—Below.

Special Offer! Order your Engine and Carburettor Sets together for 17s. 6d. For those readers who prefer to buy the finished article, workmanship excellent: Engine (finished), 65s.; Carburettor (finished), 12s. 6d. Full Blue Prints included. Write off now to: 6, Grasmere Gardens, Ilford, Essex.

1" Scale "Model Engineer" Traction Engine Castings, Boiler Material. ½" Locomotive Castings. Lists stamp.—30, Highfield Road, Doncaster.

Magnificent Offer! Bassett-Lowke Marine Horizontal Centre Flue Copper Boiler, complete with all fittings, working pressure 60 lbs., cost 75s., sell 27s. 6d.; Grayspec 15 c.c. Engine, roller bearings and independent oiling system, complete with carburettor, coil, and tank, 42s. 6d.—36, Canadian Avenue, Catford.

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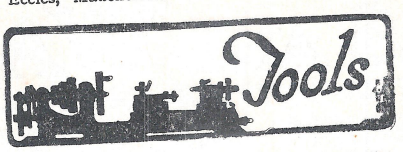
7¼" Midge Castings in stock. Wheels, 5s. 6d.; Buffers, 2s. 6d.; Axleboxes and keeps, 4s. 6d.; Hornplates, 1s. 9d.; 1" Scale Traction Engine Castings. Stamp list.—GOODMAN, 76, Spencer Road, Wealdstone, Middx.

Vertical Double Acting Steam Engine, solid crank, £1.—COOPER, Alder Street, Winton, Eccles, Manchester.



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Buck and Ryan's Lathe Department. Drummonds, Milnes, Myford, Exe, Union, Portass, Edgar, Bantam, Boley-Lienen, I.XL. 5" Leader, Master, and many other well-known makers. Send your enquiries to our special Lathe Department M.—310-312, Euston Road, London.

Eureka High Speed Ballbearing Drilling Machine. Castings and drawings from 12s. 6d. Also Rotary Milling Tables and Filing Machines. Particulars and photo, 3d. each.—POYSER, Peck's Hill, Mansfield.

Have You Placed Your Order for a "Myford" 3" Lathe? All the leading Tool Merchants stock this machine. Illustrated lists and address of nearest agents from: THE MYFORD ENGINEERING CO., Neville Works, Beeston, Notts.

Burnerd Chucks, British Made, for accuracy and lasting service. Small independent 4-jaw with steel bodies, and reversible jaws, minimum weight and overhang, ideal for model, instrument, and precision work, 3½", 20s.; 4", 21s.; 4½", 25s.—Below.

6 in. Independent Model with semi-steel body, suits Drummond 3½" and 4", and larger lathes, 50s.—Below.

3 in. 3-Jaw Lever Scroll Model with 2 sets jaws, 27s. 6d. Small overhang, light weight. Descriptive lists, with backplate prices, on request. All postages extra. Obtainable from all tool dealers; or from: F. BURNERD & Co., Dryburgh Works, Dryburgh Road, London, S.W.15.

Lathes, Power and Treadle, by all the leading makers, in stock. Send your inquiries.—Ross & ALEXANDER (LONDON), LTD., 165, Bishopsgate, E.C.2.

Milling Attachments, Dividing Heads, Circular Table. — WHEELER CO., LTD., Trench, Wellington, Shropshire.

Astounding Offer! Twenty-Four 18 in. Lengths Assorted B.A. Hexagon Free-cutting Bright M.S., 2s. 6d. post free. — GREGORY AND SUTCLIFFE, Huddersfield.

Bench Legs, Strong, Slotted Angle Iron Framework easily fixed and adaptable for Shelving underneath, from 16s. pair. Particulars, stamp. — GREGORY AND SUTCLIFFE, Huddersfield.

Build Your Own Lathe. S/H parts cheap. Pair 4" B/gear Heads, 20s.; Plain Head stock, 10s.—Below.

Lathes, 3½" "Drummond" and other makes, plain and s/cutting, treadle or power. Prices from £7 10s. Stamp reply. — FORD, 174, Vicarage Road, Leyton, E.10.

Tools by Easy Payments. Lathes, 25s.; Compound Rests, 15s.; Foot Treadles, 35s.; Saw Benches, Power, £3; Treadle, £6 10s.; Constructor's Saw Fitments, 12s. 6d. Lists, 2d.—BROWN BROS., Accrington.

"Pallas" L. High-speed Milling Machine, ungeared, auto long feed, six table feeds, working surface of table 20 × 7, self-acting 14¾, traverse 6½, vertical 14¾, Arbor No. 3 morse taper vertical attachment, dividing heads, pump and fittings, countershaft, weight 900 lbs., new, unused, up to date, £40; details stamp.—VERNON, Elmhurst, Chinnor, Oxon.

Glass Brushes for cleaning Commutators without risk, perfect insulator 8" long, 2s. post free.—Below.

Guaranteed 12 Months. Electrical Drills, Universal Motors, any voltage, Chrome Steel Gears, complete with tri-core cable, ¼" capacity (M.T. spindle), £6 10s.; ½" capacity (Whitton Chuck with key), 55s. Photo stamp. —HOLMES, Engineers, New Cross Street, Bradford. 'Phone 4324.

Lathe, 4½", B.G.S.C., G.B., with ¼ h.p. A.C. motor and countershaft, £9.—17, Godstone Road, Whyteleafe, Surrey.

Lathe Bed, 4½" centres, 10s.; Compound Rest, 4½", 10s.; Tailstock, 4½", 10s.; 3-Cone Pulley, 5s.; Faceplate, 8½", 5s.; 21v. Dynamo, 20s.; 1½ H.P. Petrol Engine Castings, most machining done, 15s. Exchanges. Want Shaper, Miller, Power Drill. — J.H.W., 29, Regent Parade, Harrogate.

Our Popular 1s. 9d. Bargain Parcels, any four lots, 6s.; Lot 1, Six Whit. Taps, 3/16" to ⅜"; Lot 2, One Dozen High Speed Number Drills, sizes 12 to 48; Lot 3, 12 Doz. Bright Steel Washers, ⅛" to ⅜"; Lot 4, 12 Doz. Whit. Screws, ⅛" to ¼"; Lot 5, One each ⅝" and ⅜" Whit. Taper Taps; Lot 6, One Doz. Assorted Whit. and B.A. Taps; Lot 7, One Doz. Small Files, 4" to 6".—Below.

150 Sets B.S.F. Taper Taps, guaranteed perfect and brand new of very best quality; Sizes, ¼", ⅜", 7/16", ½", 9/16", ⅝", ¾", actually worth 9s. set, clearing at 3s. 6d. set; also ⅞" and 1", 1s. each; a very good bargain.—Below.

4,000 Bundles Best Blue Twill Emery Cloth Strips, various grades, ¼" to 2" wide, weight of each bundle, 1lb., clear, cheap, two bundles 1s. 6d.—Below.

500 No. 1 Morse Taper Shank End Mills, 11/16" diam., short pattern, right-hand, suitable for lathe, 1s. each.—Below.

40 Gross Superior High Speed Twist Drills, clear for cash, actually worth 4d. to 1s. each, size 1/16" to ⅜", a real gift, 21s. per gross; 12s. half gross.—Below.

250 Bundles Bright Drawn Mild Steel, approx. 5' length each piece, sizes ⅛", 5/32", 3/16", 7/32", ¼", 9/32", 5/16", ⅜", 7/16", ½" round, 5s. 6d. per bundle of 50'; also Square Bright Steel, sizes ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", 5' lengths, 6s. bundle.—Below.

500 High Speed Tap Fluting Cutters, cuts taps ⅛" to ⅜" dia. of cutters, 1¼", ⅛" hole, 1s. 3d. each, three assorted, 3s. 3d., worth 6s. each; also larger Cutters, 2½" dia., ⅛" hole, cut taps ¼" to 1", 1s. 9d. each; three assorted, 4s. 6d.—Below.

250 Sets Feeler Gauges, 10 blades, long taper, 1½ to 25 thous., a very useful bargain, 1s. 9d. each.—Below.

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140 Vee Blocks and Clamps, machined all over, very useful to model makers and machinists, 2s. 9d. each; 5s. pair.—Below.

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500 Gross Tungsten Steel Hacksaw Blades, 8", 9", 10", 12", 1s. 3d. per doz.; 12s. per gross; also Machine Blades, 12" × 1", 2s. doz.; 20s. gross; 14" × 1", 3s. doz.—Below.

1,000 Sets Hexagon Die-Nuts, C.E.I. Cycle Thread, 3/16", ¼", 5/16", ⅜", usual price 5s. 9d. set, clear at 2s. 3d. set.—Below.

1,200 Best Quality Straight Shank End Mills, standard sizes, ¼" 1s. 3d.; 5/16", 1s. 4d.; ⅜", 1s. 6d.; 7/16", 1s. 9d.; ½", 2s. each. All right-hand, suitable for use in lathe.—Below.

200 Gas Thread Taps, ¾", 1s. 6d.; 1", 2s.; 1¼", 2s.; 1½", 2s. 9d.; 1¾", 3s. 6d.; 2", 4s.; 2¼", 4s. 6d.; 2½", 6s.; 2¾", 7s. 6d.; 3½", 8s. 6d.; 4", 10s. each. Taper, second or plugs. All best American or British make.—Below.

5,000 Small Slitting Saws, ¾" dia., 1/32" thick, clear at 2s. per doz.—Below.

2,000 Slitting Saws, 2½" diam., ⅝" hole, also 2¾" diam., 1" hole, 1/64" to ⅛" thick, six assorted, 3s. 6d.—Below.

1,300 Sets Hexagon Die-Nuts, Sheffield made, Whitworth, B.S.F., also American thread, U.S.S. and S.A.E. suitable for Ford and other American cars ¼", 5/16", ⅜", 7/16", ½", worth 7s. set, our clearing price, 2s. 9d. set; all the above four sets, 10s. lot. —Below.

3 Tons Best Sheffield Files, Flats, Half Rounds, Square, Rounds, in rough and second cut, sizes 6", 8", 10", 12", this is a very special bargain offer, wonderful value, three dozen assorted, 10s.; also large files, 14", 16", 18", dozen assorted, 8s. 6d. carriage forward.—Below.

60 Only, Genuine Norton Grinding Wheels, suitable for general shop use, 9" dia., 1" wide, 1" hole, 4s. 9d. each, also few 1¼" wide, 5s. 9d. each.—Below.

1,000 Fine Emery Wheels, 2" to 4" dia., ⅝" hole, ⅛" to ¼" thick, slightly used, but quite serviceable, 1s. 6d. per doz.—Below.

5,000 Genuine Norton Grinding Wheels, 2½" dia., ⅜" to ¾" wide, ¾" hole, three assorted, 1s.; dozen assorted, 3s.; six dozen, 15s.; gross, 25s.—Below.

10s. Orders Carriage Paid except where stated otherwise, steel bars and files carriage extra.—J. BURKE, 30, Trippet Lane, Sheffield.

20,000 High Speed Twist Drills, 1/32″ to ⅛″ diameter. Splendid value. 3 doz. assorted, 2s. 6d.—Below.

200 Only, Genuine Ground Thread Taps, ½″ Whitworth. Tapers, seconds, plugs, 1s. each, 2s. 6d. per set of 3.—Below.

250 Large Taps, 1¼″, 1⅜″, 1½″, 1⅝″ Whitworth. Tapers, seconds, plugs, 2s. 6d. each.—Below.

750 B.S.F. Taps. Tapers, seconds, plugs, ¼″, 6d.; 9/16″, 8d.; ⅝″, 10d.; ¾″, 1s.; ⅞″, 1s. 3d.; 1″, 1s. 6d. each.—Below.

140 Recessing Tools. No. 2 Morse Taper Shank. Sizes ½″ to ⅝″ diameter. Clearing the remaining few at 3 assorted, 3s. 6d. Actually worth 7s. 6d. to 10s. each.—Below.

40 Only, Straight Shank Recessing Tools, ½″ to 7/16″ diameter. Clearing at 3 assorted, 2s.—Below.

Given Away! 165 Large Taps, 1.3/16″, 1.5/16″, 1.7/16″. Whitworth. 6d. each.—Below.

24 Only, End Mills. No. 2 Morse Taper Shank, approx. ⅝″ diameter, 2s. each. Also a few with teeth slightly chipped but quite serviceable, 9d. each.—Below.

12 Only, 60 deg. Angle Cutters, 1¼″ dia., ⅝″ hole, worth 10s. each. Clearing at 4s. 6d. each.—Below.

800 Sets 1″ Circular Dies. Screwing ¼″, 5/16″, ⅜″, 7/16″, ½″ Whitworth and B.S.F. Clearing at 2s. 9d. per set. Both sets 5s. Die Stocks to suit, 1s. 9d. each.—Below.

4,000 High Speed Number Drills. Sizes, No. 2 to 48, 2s. per doz., 20s. per gross, 10s. 6d. half gross.—Below.

20 Dozen No. 1 Morse Taper Shank Twist Drills, ¼″ to ½″ dia. 6 assorted, 4s. Also No. 2 Shank Drills, ⅝″ to 1″ dia. 6 assorted, 6s. 6d.—Below.

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250 Sets of Figure and Letter Punches, ⅛″, complete in case. Set of figures, 2s. 6d. Set of letters, 6s.—Below.

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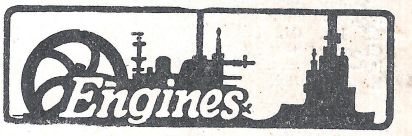

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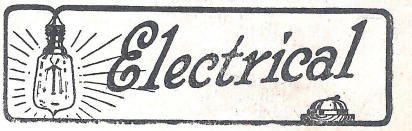

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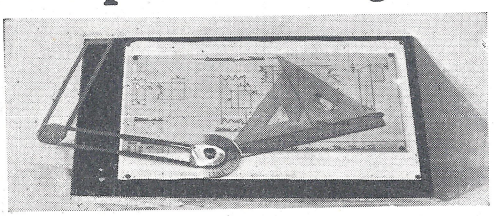

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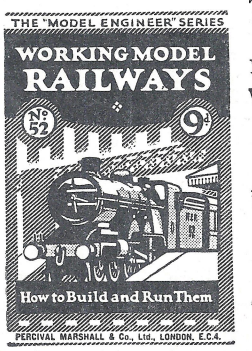

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